

December 7, 1929

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AVIATION

The Oldest American Aeronautical Magazine

CERTIFIED TRAILS AND *Safety Ratings*

Airport Lighting METHODS

WHAT PRICE *Mergers?*





RING TRUE
BOHN
BEARINGS

do not fail!

TWO RECORD PERFORMANCES

Blaze a New Name Across the Nation's Highways

INLAND SPORT MONOPLANE

In a fully loaded and loaded trim, off the production line, Lieutenant Wilfred G. Bilezikian recently made a new world's speed record for the 100-mile closed course at Cessna, Kansas, in his Inland Sport monoplane. The plane was the same he had previously flown in establishing a new American record for altitude.

Monoplane record could be broken. It was not seriously discussed or looked for during trials. It is exactly the kind of ship you would expect to see on the modern airway. Wingspan 36 feet, engine, on the creation of shear which averaged a load of 3,054 pounds, including pilot.

100.77 Miles an Hour

World record for closed course

On November 4 Lieutenant Bilezikian flew his Inland Sport Monoplane with a Warner 600 HP engine over a 100-mile closed course at 100.77 miles an hour, or an average speed of 103.17 miles an hour. This is 3.71 miles an hour faster than the former record, which was set by Captain E. A. D. Geddes, an Englishman, October 20, 1928, by 12.5 miles, on English roads.

19,639 Feet Altitude

American record for flight plane

Yesterday on October 15, Lieutenant Bilezikian again flew his Inland Sport monoplane record for altitude by flying over Inland Sport Monoplane to a height of 19,639 feet. This is over 2,000 feet above the world's record.



THESE own records are official evidence that the Inland has performance far beyond the ordinary.

Inland Sport Monoplanes are manufactured in a fine new factory at Peoria, Illinois.

The Inland is a high-wing, two-seater monoplane with retractable landing gear.

It is powered with a Le Rhône 60 or Warner 600 HP engine.

We invite all well-equipped aviators who have time to do so to come over plane to sample their flies as well as investigate the Inland proposition. For information, send for our catalogues and for prices, terms and schedules, the INLAND AVIATION COMPANY has few equals.

INLAND AVIATION COMPANY
KANSAS CITY, MISSOURI

7 ESSENTIALS IN ALL MET WITH

- ✓ FIRE SAFETY
- ✓ ECONOMY
- ✓ SPEEDY CONSTRUCTION
- ✓ PERMANENCE
- ✓ LOW MAINTENANCE
- ✓ LOW DEPRECIATION
- ✓ DECREASED HEAT LOSSES

A few minutes work with your pencil can save you much grief and many dollars . . . Just note down every essential that an ideal airport building material should have—then check them against the things that Natco Structural Clay Tile will give you. Natco, from one source of supply, fills every need, meets every requirement, eliminates guess-work and regrets. Its years of service in outstanding buildings all over the country is a guarantee to you of complete satisfaction.



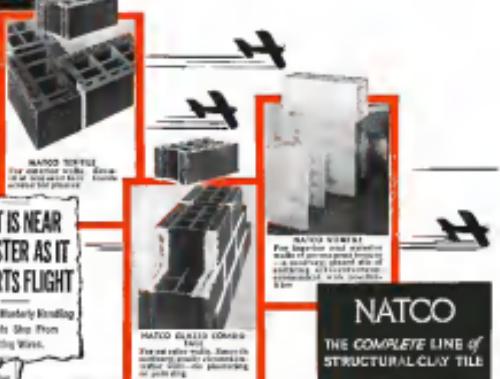
CRAFT IS NEAR DISASTER AS IT STARTS FLIGHT

Craftsmen's Mistaken
Preventive Shop From
Hitting Waves.

BETTI DIES

Bette Plot, Last on Flight,
Crashes into Waves. She
Was Sliding Along Road
When Pilot, Miss Smith, 26, of
Moore, Okla., called when she
was about to land.

NATCO INSULATING CLAY CONCRETE
just insulates better and
lasts longer than any other
clay tile. Undergoes
a special heat treatment
process that creates
a unique insulation pro-
tection in addition



NATIONAL

AIRPORT CONSTRUCTION ONE BUILDING MATERIAL

✓ FIRE SAFETY

Natco Structural Clay Tile are molded from special clay and baked in great kilns, at a temperature of over 2000 degrees, so the density and strength of each absolutely non-combustible, they help combat fire and afterwards prevent a recurrence of damage.

✓ ECONOMY

The large, ready handled units are laid at double savings in time, labor, materials, and expense. From start to finish, upkeep is small.

✓ SPEEDY CONSTRUCTION

The unique types of Natco Tile provide a new and style for construction that is revolutionizing airport design in volume in several fields. Natco airport structures go up with great speed, are quickly ready for use.

✓ PERMANENCE

Natco Tile are unaffected by heat and cold, dampness, chemicals, and weather. They are permanent in character and quality, never fade, rot, warp, or deteriorate. Airport buildings constructed of Natco are up to snuff.

✓ LOW MAINTENANCE

Because Natco Structural Clay Tile is pre-molded in shape and in form, and never drugs or dilutes, there is nothing to wash off, nothing to clean up, nothing to sweep off, nothing to remove, no discarded non-insulated materials.

✓ DECREASED HEAT LOSS

NATCO

**THE COMPLETE LINE OF
STRUCTURAL CLAY TILE**

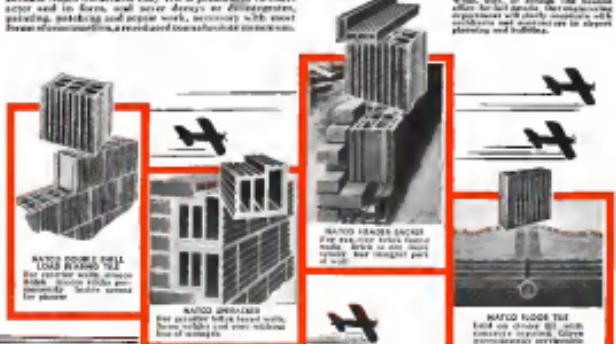
✓ LOW DEPRECIATION

Natco Structural Clay Tile may be truly called "Off-the-shelf to the Everlasting Books." Buildings built of it are highly resistant to all the operations of deterioration and decay. Depreciation is usually figured at 5% a year.

✓ DECREASED HEAT LOSS

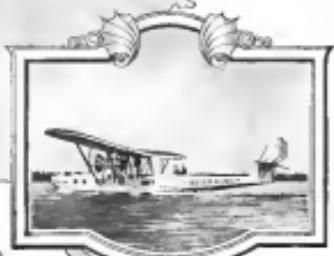
Natco Structural Clay Tile are designed to be porous, which confers high insulating values. The passage of heat and cold is retarded to a surprising degree. This feature is particularly important in all buildings, and especially in hangars.

Natco tiles, or enough of them, make excellent insulation equipment. One Natco header tile is equivalent to 1000 square feet of insulation. Natco tiles are dry-set and therefore are dry-set plastering and finishing.



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In Canada: Fire Proofing Company of Canada, Ltd., Toronto, Ontario.



The COMMODORE

"The pride of the sky"

If any evidence were needed that aviation had cleared from a hazardous adventure to a world industry of vital importance it is furnished by the Consolidated Commodore.

These great seagoing air liners, with a wing spread of 103 feet, and a carrying capacity of 25 passengers and thousands of pounds of air mail, airmail safely and rapidly along an 8000 mile route—square! We deserve between New York City and Biggs, Africa in seven days.

Designs of planes capable of accomplishing such vast transportation enterprises now turn seriously to Aluminum and its alloys, as the one material that will serve their purpose.

The Consolidated Commodore is a notable example. Previously the aircraft was fabricated from strong but brittle Aluminum Alloy, surfaced on exposed parts with pure Aluminum

—a protection against corrosion known as the ALCLAD process.

Even the Commodore's wings—aluminum depend upon strong Aluminum Alloy to therapeutic effect, under weight—and all sluggish and saggy flight ratings—plus. Crank case, necessarily drive housing, piston, cylinder heads, diffuser sections and nose and rear sections of those reliable Pratt & Whitney engines are made of strong, homogeneous Aluminum alloys.

The technical staff of Aluminum Company of America, creators of strong Aluminum Alloys and ALCLAD products, assist, consults with designers and builders of all planes of the application of Aluminum to aircraft.

ALUMINUM COMPANY OF AMERICA
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ALUMINUM AND ITS ALLOYS FOR AIRCRAFT



THE NEW 7-PLACE LOCKHEED VEGA

World's fastest commercial plane . . .
with lowest cost per passenger mile

For commercial purposes, the new Lockheed Vega offers airline owners a 7-place ship that is unquestionably the fastest and the most economical transport plane to operate. With a speed of 165 m.p.h. it cuts passenger-mile costs to the lowest—and earns a premium for passengers in time saved.

The new 7-place Lockheed Vega is priced at \$18,900.
Complete information will gladly be sent upon request.



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DIVISION OF

DETROIT AIRCRAFT CORPORATION

Burbank, California

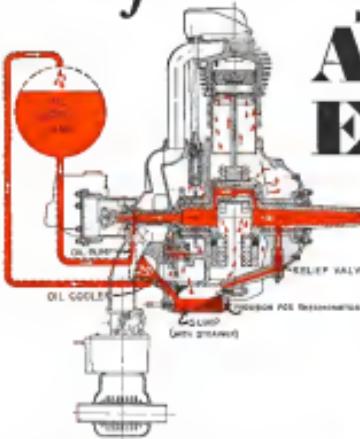
Union Trust Building, Detroit

Perfect Lubrication



IN THE
Axelson
E n g i n e

OIL CIRCULATION WITH economical RECOVERY SYSTEM



The lubricating oil passes from the supply tank through the pressure pump, on the rear of the engine, entering the hollow crankshaft. The passages for the oil are integral with the crankcase. The oil leaves the crankshaft at the front main bearing, passing through the pressure relief valve, which is built into the front crankcase section. From the relief valve, the oil enters the oil sump, where it is passed through a double mesh oil screen. It then leaves the oil sump via a short external line of ample diameter—the only external line of the entire system—passing through the scavenging pump into the oil cooler. The temperature of the oil is thus modified to the best operating point, the excess heat being transferred to the intake air mixture. The scavenging pump吸油 the oil cooler and is connected directly thereto without any piping. The cycle is completed by a connection from the

oil cooler back to the supply tank. In addition to the front oil breather, there are two breathers located in the central crankcase section, thus assuring proper crankcase ventilation. Provision is made in the oil sump for inserting a thermometer.

This positive system of lubrication of the main bearings is based on the most approved principle and assures uniform distribution of the oil at all times.



Axelson Aircraft Engine Co.
Executive and General Offices
Corner Randolph St. and Boyle Avenue
Los Angeles, California
TE. B. RAY 4-1111

AXELSON AIRPLANE ENGINES

Boeing Demands

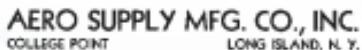
Quality



"In the building of these huge planes the Boeing Company spared no expense and quality was the first requirement in choosing materials."

".....that the Boeing Company is the building of these great transports selected your products."

... Through years of experience—Boeing has found that Aero Supply products have met their own high standards of excellence. That's why Aero Supply was called upon to furnish the hundreds of small "hardware" parts, such as bolts, nuts, washers, shackles, clevises and many other items, used in the structure of its latest model . . . the new 18-passenger Boeing Transport.



SUBSIDIARIES
NATIONAL STEEL PRODUCTS CO., DAYTON, O.
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COMPANION PLANE TO THE VIKING FLYING BOAT



THE
KITTYHAWK

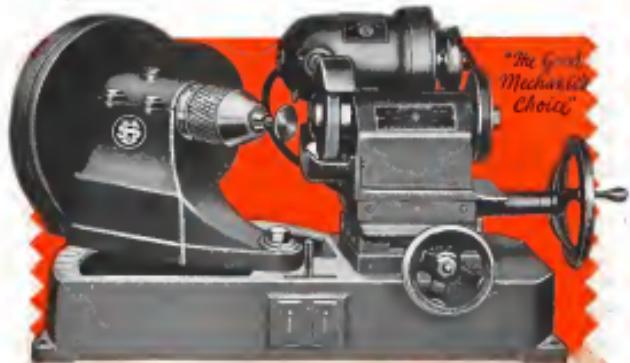
First and foremost built for safe flying

To gain superiority in either speed or performance a plane must sacrifice safe flying qualities. The Kittyhawk has not attempted to develop these features at the expense of its general all-round characteristics for safe flying . . . it will travel at 110 miles per hour . . . it will out-perform most planes in its class . . . but first and foremost the Kittyhawk is built for safe flying. With a landing speed of 38 miles per hour . . . with a wheel tread of seven feet two inches . . . the Kittyhawk is particularly adept at getting in and out of small rough fields . . . a factor which enables even the inexperienced pilot to land under unfavorable conditions . . . with a greater degree of safety.

SPECIFICATIONS

Kittyhawk Model E-4	Single B-6, 100 H.P. NACA Standard Type Compressor
Length overall	30 ft. 11 in.
Span overall	37 ft. 0 in.
Height overall	9 ft. 6 in.
Cross side wings	4 ft. 6 in.
Wing area	235 sq. ft.
Weight empty	1,300 lbs.
Weight loaded	1,900 lbs.
Max. speed	70 m.p.h.
Cruising speed	60 m.p.h.
Landing speed	38 m.p.h.
Ceiling	10,000 ft.

THE VIKING FLYING BOAT COMPANY
89 Shelton Avenue, New Haven, Conn.
Miami Hangar — The Viking Flying Boat Company (Florida) Inc.



The NEW U.S. Valve Refacer True! Foolproof!

NOW your cheapest help can reface valves quickly—and be sure of getting their results—with the new-up-to-the-minute U. S. Valve Refacer. It's foolproof—and turns out smooth, true jobs without difficulty.

It grinds valves having 1/2-inch diameter stem or less, of any length, with heads up to 6-inches diameter, and from 15 to 90 degrees. Besides the U. S. Valve Refacer can be equipped fully with grinding attachment for both straight and spiral cutters, rocker arm grinder

ing attachment, tappet grinding attachment, and attachment with microscrews adjustment for grinding ends of valve stems.

Grinding wheel and valve spindle bars on SKF Ball Bearings, and are operated by separate, belt driven, universal motors (for A.C. or D.C., 60 cycles or less). Comes complete with diamond wheel dresser, titter grinding indexing support, and electrical connections. Larger chucks and steel table with valve rack also can be furnished if desired.



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of a famous family—



Wasp Junior

a 300 H. P.
ENGINE, BY
PRATT & WHITNEY



Front Side View

To the indicated power
"Wasp Junior" develops dependably
with high performance, low initial
cost and economy of operation.



Three-quarter Front View



To transport operators
"Wasp Junior" transports easily
in front of a "Whitney" engine from 300
to 575 H. P., reinforced with a
thick block of gimbals and side service
valves.

A 300 H. P. "Wasp" . . . a product with a background of history . . . of outstanding achievement . . . a "Baby Wasp" . . . with 80 per cent of its parts interchangeable with those of the world-famous "Wasp" and "Hornet"—that's the "Wasp Junior" . . . which now invites your inspection on critical comparison. New only in name . . . "Wasp Junior" combines expert engineering with the experience gained in millions of miles of flying.

It has all the performance characteristics that have made the names "Wasp" and "Hornet" stand for "dependable flying

power" under every operating condition. Weighing 350 pounds and 45% in diameter, "Wasp Junior" develops 300 H. P. of 2,000 r. p. m.

"Wasp Junior" was designed to meet the requirements for an engine of this size, having the dependability and long life that have made the "Wasp" and "Hornet" internationally famous.

To be manufactured in the most modern aircraft engine plant . . . now under construction . . . "Wasp Junior" will be produced to meet the full demands of the industry.

THE
PRATT & WHITNEY AIRCRAFT CO.
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Manufacturing is carried by Canadian Pratt & Whitney Aircraft Co., Ltd., Longueuil, Quebec, and Continental Engines by American Motors Corporation.

Wasp & Hornet
Engines



A-D-C Specialists  **Will Advise You**

WE do not believe that losing the taxpayers with something far more elaborate than they require has any part in the healthy growth of aviation.

We feel that our first function as consultants is to discuss impartially the primary question of

whether the building of an airport is really warranted. If, in the light of our expert survey of conditions, the need for an airport does exist, A. D. C. coordinated service will design and build the type of airport that will meet the needs of your particular city.

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STROMBERG
CARBURETORS



— a part of
Axelson quality

In keeping with Axelson quality, Stromberg Carburetors were selected as standard equipment on all Axelson Aircraft Engines. For the Stromberg Carburetor, Axelson engines are designed. The best carburetor is positive setting. Large carburetors and fuel jets prevent chugging while altitude control mixture adjustment is always through the carburetor. Stromberg carburetors measure one-half of an inch in diameter and are designed to give maximum output at extreme range and full power at wide open throttle. An idling jet provides priming well for very starting conditions or reheat.

U. S. Department of Commerce Approved Type Certificate No. 38

Axelson Aircraft Engine Co.

AXELSON AIRPLANE ENGINES
Crescent Boulevard and Boyle Avenue
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AXELSON AIRPLANE ENGINES



at ease in the air

Of two engines with equal power, that one is better which moves least itself by the stream—never strains itself in developing its rated power—never sacrifices strength for reduced weight.

This is the Comet Idea—the first departure from wartime standards in aircraft engine design.

Men and women who take the air with Comet engines enjoy flying more, because Comets always function well within their limits of aeronautical strength, always hold an ample reserve in the interest of steady, safe flying operation.

Working without stress, Comet engines give hundreds of hours of uniform service, without overhaul or expert attention.

Comet brings to flying the same ease and certainty of operation that drivers of automobiles expect as a matter of course.



BY • BERRYLOID • FLEET • NUMBER • NINE



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"71" with *✓*

Berryloid
AIRCRAFT FINISHES

The Fairchild Airplane and Manufacturing Corporation chose Berryloid Aircraft Finishes for superior "quality, appearance and durability." Kreider-Reisner planes are also finished 100 per cent with Berryloid. Nungesser Green and Vent Yellow beautify the Fairchild and Challenger in the above illustration.

COMET ENGINE CORPORATION
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Great aircraft engines are manufactured at Madison, Wisconsin, under the direction of the Elkhorn Machine Company. For 40 years builders of fine machine tools in use throughout the world.—7 engines, 460 horsepower (maximum) guaranteed ratings.

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Finishes
meet
FAIRCHILD'S
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Paint Solvents

**Move the Bench
 Not
 the Job**



Pat'l and Pat'l Pending

**"Hallowell" Semi-Portable
 Work-Bench of Steel**

A Semi-Portable Work Bench on two casters—so you can trundle around from place to place [from job to job]—but don't that shade you?

Before the "HALLOWELL" Semi-Portable of Steel, your bench was a fixture—once in position, there it remained.

Not so with the "HALLOWELL"—grab the handles and trundle Bench and all to where you want it;

let go, and the "HALLOWELL" finds its two plain feet and becomes, at once, rigid as a rock.

And when the job is finished, roll the "HALLOWELL" away and leave it where least in the road, in aisle and wall spaces can be used to best advantage.

Otherwise the construction is just like the now famous line of

"Hallowell" Steel Benching

Bulletin 588, 414, and 416—Years for the Asking

STANDARD PRESSED STEEL CO.

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BOX 38

3 OIL COMPANIES

Standard Oil Company of California
 Standard Oil Company (Indiana)
 Standard Oil Company of New Jersey

EACH CONTRIBUTED ITS
 EXPERT KNOWLEDGE TO

STANAVO



Then...

proved its incontestable
 stamina in countless flights
 as the utmost in AVIATION
 ENGINE LUBRICANTS



Designed by the leading experts and engineers of these oil companies made from the finest raw materials that nature affords, refined and tested for weeks and months in the laboratory, on the ground and in the air—Stanavo Aviation Engine Oil is the day's outstanding contribution to Flying.

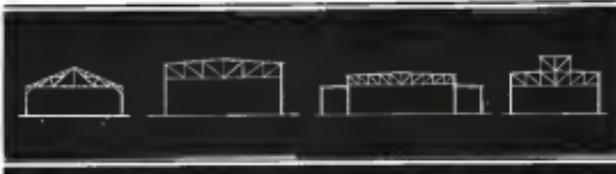
To make possible the development of Stanavo, these three Companies pooled their resources and facilities at the disposal of the Stanavo Specification Board, Inc., an organization of scientists selected because of their experience and skill in aviation and oils. After months of effort, during which hundreds of tests were made, these experts produced the oil that aviators today acclaim as "unparalleled in quality and uniformity."

The Stanavo Specification Board, Inc., will continue its rigid specifications and exacting tests for all aviation products bearing the Stanavo trade mark. Stanavo (in grades suitable for all operating conditions) is available at the landing fields and airports of the nation. Full information may be obtained by addressing the Stanavo Specification Board, Inc.





AND AUXILIARY BUILDINGS FOR THE AIRPORT



R. K. SHAFRAZ is Operations Manager of Technical Air Service, Inc., New York and Boston.

1

Barclay, Standard, 20000000
Bartons, 1000000
Bartons, 200000

Mr. H. W. Seeling, alias Willi
was at present living
there.

Page 80 | Zekoff

With regard to the outside traps which are now set up at the Ranchos, I wish to advise that there were none taken for the previous month. Going on my authority, I "had them" and had them.

The speed available, assuming the
presenting of such a condition with an engine and when
the engine is required only to supply the wind in the channel,
is proportional with the square of the distance between the station
and the headwind. I have made a series of observations over
old ship tracks, and I would say that a wind will sweep
from the end of the channel, before it reaches

After laundry I come home. The next 18 hours are up to the master peasant. The next 18 hours are up to the master supervisor. A previous month of the peasant was more or less idle.

The original Iroquois at Glendale were the same as those at Glendale, but the new Iroquois have been rechristened. The new ones are built on the larger model, and the world would be better off if they had been built on the smaller model, even though it would have been more difficult to build them. They have been built on the larger model, and the world would be better off if they had been built on the smaller model, even though it would have been more difficult to build them. They have been built on the larger model, and the world would be better off if they had been built on the smaller model, even though it would have been more difficult to build them.

Yours very truly,
John M. Palmer



*America's
Central
Showplace*

presents—February 15th to 25th—

The International Aircraft Exposition

At the most central and accessible Aviation City in the whole United States, St. Louis offers, with its huge Areas, segregated facilities for the one officially-sponsored International Aircraft Show to be held during 1939.

Serving this natural center of Aviation is half the total railway mileage of the nation. Fast, direct transportation is offered to and from every section of the country. None that so far other large city in the national center of population

offered hotel accommodations are here. There are four famous flying fields; five aviation schools; four complete manufacturing, an engine factory, a great transcontinental survey headquarters; and scores of allied and subsidiary manufacturers. St. Louis presents, in itself, a lively pattern of vital interest to everyone concerned with Aviation.

The new St. Louis Aerodrome, just completed, is the largest permanent show place in

the world. Its main structure seats 25,000 people. Planking this are two large exhibit buildings, each containing more than 16,000 square feet of floor space. Through their doors, planes are wheeled directly in from the adjacent landing field without dismantling.

Convenient open trades are on the sides. The buildings have a main basement. The Aerodrome is close to the center of the city. Union Station is only ten minutes' street ride distance. Cars and buses pass the door. Parking space for thousands of cars is provided.

Here, during February next, will be held the greatest Aeronautical Exposition ever undertaken. Everything new in Aviation, the basic developments from Europe and America, will be gathered here. Plans to be in St. Louis, without fail, during the third week of February!

The Industrial Club of St. Louis
315 Locust Street • • • St. Louis, Mo.



Detailed information
relative to the Interna-
tional Aircraft
Exposition can be
had by addressing
the Aeronautical
Chamber of Com-
merce, 10 E. 49th
St., New York City.

ST. LOUIS

CENTRAL MANUFACTURING CITY OF AMERICA



**THIS BETTER METHOD
OF HANGAR HEATING
*saves money***

The men do their work faster and better in hangars heated with Trane Unit Heaters. Heat goes where they need it, down to the working level instead of up the walls and just under the roof.

When the hangar doors open cold blasts of air are checked—by proper placing of Trane Unit Heaters.

The planes, too, are protected from rapid deterioration caused by radiant rays from old fashioned radiation. Trane Unit Heaters give off none of these rays which warp fabric and struts.

These decisive heating advantages may sound high priced. But they are just the opposite. In a new installation, Trane Unit Heaters cost 30 to 40% less than equivalent cast iron or pipe coil radiation. And they save as much as 25% on your annual heat bill.

Get the whole story on this up-to-the-minute method of heating. Mail coupon today.



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UNIT HEATING SPECIALISTS

HEAT WITH UNIT HEATERS

THE TRANE COMPANY, INC., LTD.
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Send complete information on Trane Unit Heating for hangars

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AMERICAN AVIATION and PAN AMERICAN AIRWAYS

BACKED by whole-hearted cooperation of the chief American railroads and of important Groups in America's Aviation Industry, Pan American Airways has given in two years from a single line of 251 miles, to the largest unified international air transport system, not only in the Americas, but in the world. More than 12,000 miles of airways on the Pan American System—over 1,000 passenger routes, permission to and through the West Indies and Mexico, Central and South America.

Assistance of the United States Government in the form of air-mail contracts made this growth possible. Enthusiastic cooperation of the Governments in Central and South America played an important part in developing the unified Pan American System.

New Pan American routes were to fulfilling the unbroken promise of an airline... an air transportation system reaching every American country.

Pan American Routes

Daily service from Miami, Havana has given from one service to seven each day. Twice weekly service to Nassau has become daily. Daily service (except Sunday) has been established between Miami and San Pedro, British Honduras, Santiago, Chile, Santa Barbara, Panama, Puerto Rico—with weekly service from San Juan to the Windward, Leeward, and



PAN AMERICAN AIRWAYS, INC.

122 EAST 42nd STREET, NEW YORK CITY

KILL FIRE WHILE IT IS YOUNG



Fire! The shadow that haunts the hangar!

Grim, purposeful, ready to pounce on man's carelessness, Fire sets its trap. It is silent, all too silent, for it strikes quickly. Considerable fires, the presence of gasoline, oil and other extra hazardous materials; the difficulty of getting planes out of the hangar quickly—all conspire with Fire and against you!

Are you sure that the Protection you have been buying is the complete answer? In how many cases can such a fire set the planes in the hangar from Fleet? Fleet will fly our airport equipped to fight fire when it comes—for sooner or later it will come!

The first few minutes of any fire's life are vital minutes for you. Quick action with the right fire extinguisher can snuff the flames before they spread. American LaFrance and Foamite products include every type of fire-resistant fire fighting device from our plant extinction galleries to the largest motor fire apparatus. From a background of experience and knowledge, Foamite can authentically recommend correct protection for your airport—fire-extinguisher equipment, automatic systems, or mobile fire apparatus. This company's service analyzes your risks,

insists the equipment, installs your equipment in its use and, if desired, inspects and maintains the equipment.

Send for "Station Protection". This booklet describes the devices of support for the protection of airports by the various types of American LaFrance and Foamite equipment. American LaFrance and Foamite Corporation, Engineers and Manufacturers, Dept. T-6, Elkhorn, N.Y.



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THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

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Accident Causes in the Spotlight

THREE SENATE of the United States having recently directed that the results of the official inquiry into the cause of the fatal crash of a passenger airplane on the site of a New Mexico mountain two months ago should be made public, the Department of Commerce has had no alternative save to comply. Material that has always been held secretly confidential must be spread upon the record. A postscript has been created and inevitably there will be repeated attempts to secure the same public exposure of the results of the Department's inquiries into other cases. The decision rests with Congress, which has full and unquestioned power in the matter. It is a decision fraught with great significance for the aircraft industry, and the industry cannot be indifferent to the course followed. From the point of view of aeronautical development both science and publicity have their advantages, and we have balanced these against each other long and carefully before arriving at a conviction of our own as to what would be the wisest policy.

Nothing does more to inspire public confidence than a frank listing of the facts. Let the nation get abroad that there is something sinister about airplane accidents, or that the industry does not stand forth to tell the truth to the whole world, and the most propagandists return will fit abroad. We could not, if we would, prevent public knowledge of the fact that an accident has happened. There is thus much to be said for making it known just how it happened and why, and especially for securing the consensus to point out just what is being done to ensure that lightning will not strike a second time in the second place.

Furthermore, publicity verifies the industry is good for the industry itself. The losses of a transport accident

are not confined to the company that suffers it. To print a detailed analysis is to render it less likely that anyone else will suffer a similar misfortune. The work of such organizations as the National Safety Council is based largely upon the apprehension of hindsight, pointing home the lessons of the accident that should have avoided. The operators of aircraft can learn to improve their safety record in the same school.

There is one side of the shield. We have tried to protect it surely. The arguments for publicity are cogent ones. But there is another side.

The first initiative for the refutation of hazard lies with the Department of Commerce. It is of the first importance that the Department should be able to put all the facts and get them accurately. They must be secured as a basis for possible modifications in the Department's regulations and methods. They serve also as the raw material of those general surveys and classifications of accident causes that are periodically prepared, and that are of even more value as a guide to operation than separate studies of individual crashes could be.

It is of the first importance that the Department should get all the facts, but often it cannot be done of publicity is liable to expand. The most pertinent information concerning an airplane crash is often possessed by but one or two people. If they can talk in complete confidence, they will almost always speak frankly. If they have to feel that they are talking to the newspapers they will be very cautious about saying what they may think but may not positively know, and they would be less than human if they did not seek to adduce the imbecility of timidity requiring blame or incompetence in individuals who may have lost their own lives in the crash. The spirit de corps of those who work in aviation is

strong, and largely so. They never display any eagerness to close the issue of an accident by the simple expedient of finding a dead witness.

Likewise, the Department itself often has to speculate in its report, for lack of positive information. When the sole object is to extract information useful in arriving at a maximum of the accident, it is quite permissible that the plot be filled in by as much guessing as necessary. In a report destined to become a public record, such a course would be unacceptable.

On the whole we believe that for the present the Department's policy of secrecy is wise and should be left untouched. We believe that the trend will be toward more publicity, gradually induced by making the possible accident reports increasingly specific, and by including detailed analyses of certain aspects of special technical interest but cloaking them by symbols and preserving as much secrecy as practicable. Five years hence it may be advisable to make public all but an official report upon each transport airplane crash as is now made of a railroad accident. We doubt even that, but in any case we are quite sure the time is not yet.

At least one thing is perfectly clear. Whether there be full publicity, no publicity, or partial publicity, the control in the individual case should be by the Department of Commerce, not by spontaneous sentinel wings. Already public report has been required upon an disaster (not the New Mexico one) which had no technical features of special importance, for an apparent reason except that a member of Congress was personally interested and made his interests vocal. The decision in the individual case, if there is no hope to be complete neutrality of treatment, must depend upon the facts of the accident itself, not upon the political pull, or the personal friendship with a Congressman, of someone who has either a personal grievance or a pending damage suit against the owner of the plane involved. That point is obvious. It is serious enough to deserve the attention of the sober Congressional leaders who can prevent the making through of mass resolutions for publicity or for renewed investigations.



Why the Highways?

THIS YEAR saw the most-honored owners of New York State tired of paying gasoline taxes for the support of highways. Jams into traffic hell and successfully outwitted the patently ridiculous amendment.

Airplane operators of many states are paying the same unjust taxes and fees which are obviously needed to round out our aviation programs are being diverted to strengthen roads in connection with highway development and maintenance. Gladly we note signs of protest and resistance.

We do not feel like placing the onus entirely upon the state legislatures. When such excesses were provided for by statute, few people ever thought that gasoline and flight would ever have the intimate relationship. In fact, they didn't believe in flight at all, and were even cool toward the automobile. It may safely be assumed in most cases that the only reason place owners in most states are paying gasoline taxes is because no one has demanded the legislature of the obvious need for an amendment to its particular tax statute.

In one state which provides more than its quota of gasoline and a fair share of planes to consume it, the increasing bodies are essential of every effort to find the aviation industry of that necessary burden. This is undoubtedly because they feel that the plane is not a part of the state's economic picture, but an instrument of recreation and amusement. As a matter of fact, the particular state probably benefits as much from the use of airplanes as any in the Union.

An alternative, and interesting for the sake of an opportunity to show the other side of the situation that some fuel tax may be rightfully expected of airplane owners, why not direct such income to the development of undergraduate landing fields? Why do not the states themselves among some of the borders now so ably borne by the Federal Government? Certainly they may expect the cooperation of Washington to such an end, and with the problem of financing the program fairly solved by the assurance of an income. It is our recommendation to anticipate a very great deal of good relationships morally to the Commonwealth and the aviation industry.



Murking Blanket

A NEW ENGLAND correspondent reports growing popularity for a new form of civic service. During the winter of the town in magnificently pallid letters on the most conspicuous available roof has become a favorite pastime. Young and old, agile and infirm, men and women, they have of seized hammers and buckets of chrome-pyrite lead and started to closing ledges.

We can only hope that the report is true. It seems almost too good to believe. Hope long deferred has made the cross-country pilot's heart sick. Eleven years have passed since the armistice. Non-military voyages by air have been a commonplace during two-thirds of that time. The American Legion, the Exchange Club, the Guggenheim Fund, and Chancery of Cassanova without number have made "blind" campaigns for the promotion of vented air-traveling. Yet even now the traveler by air avails to his sorrow that the term that is marked is extraordinary, a shining exception among its fellows, and my definite and vigorous action, such as is now proposed

to be undertaken must in the six northeastern states, if still a nine days' wonder.

There are some parts of the country where snow-melting is generally unknown. There are some where it is much more than frequent, or where need for further effort is lacking, although some districts, notably California and New England, show brightly by contrast with their less energetic neighbors.

In most cases there is a dual advantage: weep perhaps a little temporary publicity, to be gained from identifying the necessity for the air pilot. The series is one of almost pure altruism, but unless communities are, and not merely a free bird and there but hundreds or thousands of them cross country flying can never be as simple as it should be except for the amateur of limited navigational knowledge.

If the immediate return is small, so also is the cost and the difficulty of work. All that is needed is a little enthusiasm. Attempts to procure it on a national scale through national organizations have met with only a limited success. They must be supplemented by local pressure from those who are kindly and personally interested.

No chapter of the National Aeromotoring Association should not say as much as there is an unmarked area within fifty miles of its headquarters. No chamber of commerce that has an aviation committee, and most of them have by now, should fail to assume the responsibility both for getting its own town marked and for working upon less progressive neighbors.

Campion would of course solve the problem. It may even prove to be necessary, and at least one legislature has already faced with the idea of imposing upon each town or city government the definite obligation of identifying itself forthwith. The possibility of employing such a legal duty is one to bear in mind. We still hope, however, that civic pride, properly stimulated, may suffice. To stimulate it is a task, and should be a welcome one; for those actively interested in aeromotoring. If all of us who are so interested take the matter seriously, we should have early and frequent occasion to report progress.



International Boundaries and Commercial Aviation

AROMATICALLY, the essence of aviation is speed. To what may the speed of air transport be accountable to itself? To entangle instructions flying in a state of time-wasting red tape is to remove the name for its existence.

In a general way, the truth of these trite observations is recognized. Periodic efforts have been made to simplify the processes of customs examination of incoming

aviation inspection, and in general of all that mass of formalities that traditionally attend the transfer of passengers and goods from one national sovereignty to another.

We certainly have no wish to belittle what has already been accomplished by the efforts of the Treasury Department and the Department of Commerce, working with what cooperation other countries have felt disposed to offer, but more is needed. We are encouraged to note, as representing not a final action but a question of continuing interest, that administrative procedure has engaged the special attention of the (take a deep breath before saying it) Pan-American Commission on Customs Procedure and Port Formalities, just adjourned to Washington.

The rules developed through centuries of experience with merchant shipping hardly offer a starting point. A week or a few hours in quarantine at the end of a three-thousand-mile ocean voyage is annoying but seldom disastrous. A day or a few minutes in completing an aerial trip is much more freely rewarded by passengers who have paid liberally for extra-speed travel, and their resentment is likely to be visited upon the transport line.

Snagging by airports cannot be overlooked. It has unfortunately been rather prevalent. Measures have to be taken to check it, but they ought not to interfere unduly with the air passenger more than they interfere with the tourist. When his plane takes off in the disbarberation platform until he is free to go where he will and take his luggage with him. European governments have generally speeded up their routine of load to that extent. We ought to be able to do better in the western hemisphere—but we shall never do it by taking the rule-book for the official reception of ocean liner and going through it from A to Z.

It is not exclusively or especially to our own government that these remarks are addressed. Our travelers may even more seriously offend in the rules in force in the foreign lands that they visit. Not to it only in connection with the regular transport lines that the subject is important. They have been able in some cases to make special arrangements with governmental authorities and to eliminate delays by gaining the personal confidence and the cooperation of officials. Of almost equal concern is the status of the illegal transborder by air. Experience upon the Graf Zeppelin's first arrival in the United States a year ago afforded a brilliant example of the unhappy consequences when a determined adherence to an inflexible routine is superposed as an unwillingly understanding or pragmatism by those responsible for an aircraft's operation. To avoid future difficulties there should be constant attention for some time to come, to the development of improved procedures and the issuance of specific instructions for dealing, without friction or delay, not only with regular aeromotoring operations but with semiannual emergencies.

LOOKING AHEAD IN Airport



FIG. 1. Propeller-driven plane flying at the Cincinnati Municipal Airport. In addition to the general resolution on standard and code to produce a safe field every night through the entire 180-degree circumference in airports set or proposed by the time period. What are listed will be done about as fast as the former series. It obviously accepts a park as fast and then while light throughout the site.

WILL THIS lighting system meet the Department of Commerce requirements for an "A" rating? That seems to be the question of primary concern to airport managers in discussing or in planning airport lighting facilities. The managers of operating companies and private aircraft owners, however, for whose use the facilities are provided should have a somewhat different criterion for judging lighting provisions.

The viewpoint of the uncontrolled airport manager can be justified from the fact that, notwithstanding, particularly in the business of airport administration, well the inevitable requirement of hand seats for bush grading, sears, buildings, etc., find the element of cost a very important one. This has been a considerable factor in limiting desirable lighting practice because the result has been to provide the lowest service as far as lighting is concerned. These provisions have appar-

ently taken care of the relatively few night plane movements, coupled with the fact that most of the pilots doing night flying were experienced and extremely accustomed.

The experience of aviation in

using public areas will depend more and more upon night flying as a matter of course. Lighting, therefore, is of prime importance to the success of the industry. It is significant that lighting is one of the three major aspects on which an airport obtains a rating from the Department of Commerce, yet the standards of top airports in the nation do not require the use of such a system properly to be used from rather than is. While minimum standards are necessary, they often times set no limit premium, particularly so as competitive bids and awards are usually based on minimum standards and lower costs.

While the general requirements of lighting for night flying are fairly well understood and developments in lamps and equipment to meet those requirements have been made, it cannot be considered that the solution of the problem is at all standardized. The present interest in airport lighting has grown out of the necessity for growing some sort of illumination largely for the convenience of the public. In general, new standards will be designed for the convenience and general sense of security and well-being which the public quickly learns to expect. Airport lighting will effect



FIG. 2. Illustrative results on independent and certified observer taken at night when the ground, the field, and the sky are illuminated by artificial light.

Lighting Development

By C. E. WIEZT

A Discussion of Lighting Conditions and Problems as They Exist Today and the Improvements Necessary to Future Development

in no small way the general acceptance of night flying.

From the standpoint of the aircraft operator, obviously, minimum standards are inadequate. His concern is in the maximum of safety, general utility, and expediency of traffic operations that the best system can provide. In his business as in all other businesses the advertising value of his field will be a factor in the promotion of his services. To regain confidence and hold up passenger air travel no factor is more important than adequate airport lighting.

The cost of the best lighting system is small, compared to its service in extending the use of an airport through out 24 hours a day. Furthermore, a single serious accident—aside from the danger to human life—due to inadequate lighting might involve more expense than the entire cost of the best lighting facilities.

THIS TIME MAY COME, with the development and further use of scientific instruments, when aircraft may be operated without demands for clear seeing outside of the cockpit or control room. At the present time, however, it seems only sensible to provide the best system of illumination that it is possible to devise. Instrument flying is the most practical procedure, but it is a sort of art in this area and it is doubtful if it can be substituted in whole for the self assurance and moral satisfaction of actual seeing what there is to see. Under these conditions of mentality, how well we are depends on how well we light.

The aviation industry in its lighting provisions can well profit from the experiences of other industries and other commercial persons in their attitude toward light and

lighting economies. Industries today are employing ten to twenty times as much light as they considered necessary a few years ago. Although they were able to operate with a lesser amount of light, they have found that the demand for dividends, lower salaries, and increased production offset many times over the additional cost of more light.

Take outdoor sports at night. That is more comparable to the subject of airport lighting. A few years ago, the practicability of lighting up large outdoor areas for night sports—football, horse racing, golf, and the like, was seriously questioned. We have grown up with the instinct to be merger with light.

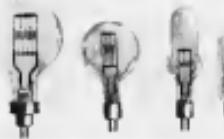
Last June there was installed at a Toledo race track about 180 low-watt light the track. This corresponded roughly to 6 foot-candles of illumination over the entire mile course. The drivers did not want to risk injury to



Night view of Cincinnati Municipal Airport with one 24-tube light-unit installed.

their high priced horses under a lower standard of illumination. In order to meet safety rating regulations for an A-1 rating at least 0.15 of a foot-candle must be provided over the landing field. Only one-fourth as much light for the safety of life and property of the aircraft operator as was provided for success and safety of horses racing doesn't seem to be a very reasonable or satisfactory condition.

Here, there, and everywhere are sprouting up practice golf courses of 10 to 15 acres, lighted after a fashion that would delight any pilot as an oasis of light in a desert of darkness. Baseball games have been played at night. On your many football fields are being lighted for night play. As this is being written, a local college decided on



As in golf, lighting needs have sprung up and baulked lamp research and development, particularly in bright red wavelengths. The large arrows, pointing to the first 3 to 10 footcandles, were less developed, despite the explosive increase.

Monday to light their field, for a game the following Friday night. Forty-eight footcandles of lighting are being used. Other conditions being suitable, a pilot could set his plane down on the "Beverly line" and easily see what he was doing. Even then, modern installations should get an A-10 rating if graded on the basis of visual conditions. And for no more serious an enterprise than football. In this case only the airport, from which there is much scheduled night flying, 20 low or less of lighting is doing

duty as the lighting system for an active area at least three times as large.

One interesting example of the use of light in other industries was the filming of the movie "Broadway" which employed over 4,000 lbs. of electrical energy for lighting the set. This roughly was more wattage than was being used in the lighting of all the 10,000 acres of lighted airports, and in the lighting of all the airports in the United States at the time of release of the film early this year. More light for a single movie production than was provided for the safety and progress of air transportation over the 40,000 acres of day and night flying areas in the country.

This is not an indictment of the aviation industry as the cost of negligence in lighting matters - it is offered only as a suggestion to be altered toward the use of light, and to look forward to improved methods that are certain to be more effective. It also implies that light, properly intensified as regards giving, is a partnership with the eye as far as vision is concerned and as we extend light in quantity and distribution to the same extent do we extend vision and how well we see.

THIS AVIATION TRAILBLAZER has left new problems at the doorstep of the lighting engineer. While the experienced engineer may understand the principles of light production, light control and light diffusion, and understand fully the relationship between light and vision, he necessarily must learn any techniques or relationships based on selected requirements of the operation. At the same time his recommendation must be practical and in keeping with administrative and financial conditions.

In meeting aviation lighting requirements new lamps and new auxiliary devices and equipment have been developed. The art of light projection has been advanced. Modern high-powered light sources combined with reflectors in designs of projection apparatus caught the popular fancy by virtue of the extremely high values of candlepower in which the new devices were rated. Unfortunately, these extraordinary figures apply to the highly unimproved illumination results.

The Airport Lighting Regulations on lighting define the



Airplanes usually approach in an off-center axis of photometric measurements and taking readings over illumination data is an almost herculean task. BMP recommended for the studies whenever a plane was known.

various elements essential to aviation service. They specify minimum allowable values as regards safety and reliability of operation with minimum lighting values in regards results. They do not say restrict or banish development and application of improved devices or methods.

The effectiveness of an airport beacon depends upon several factors:

1. High candlepower for long range visibility;
2. Visibility from all normal flying heights;
3. Suitable duration of flash period;
4. Positive identification.

In order to effect the greatest range of visibility, the beacon must develop a beam of extremely high candlepower. In practice, however, the relation between candlepower of a light source and visibility distance is dependent largely on atmospheric conditions.

If the beam is confined to a 3 to 5 deg spread in an endeavor to obtain maximum beam candlepower, the effectiveness of the beam is reduced because a plane at ordinary flying heights will benefit only for the short time it may be in the main beam. The latent U. S. Department of Commerce draws specifications for airway beacons requiring that the point in providing for a 25 deg fan of light above the main beam. In addition, two types of visual losses are provided in the upper part of the housing, which enable some light so that the beam is visible even when the beam is cut off by the obstruction of light from a projector in, however, accompanied by a sacrifice of beam candlepower of the main beam.

A third factor enters into the problem in connection with the present aviation beacons. That is, the question of flash period. The standard beacons have a beam spread of about 5 deg and rotate six times a minute. This does not allow the light to fall on the plane eye for a sufficiently long period of time to permit the eye to reach its maximum response. If the present existing beam is stopped in its rotation with the beam traced directly toward and oblique the beam appears to become much larger and brighter. A greater beam spread would probably produce a more efficient beacon.

Longer flash periods can be obtained in two ways, either by slowing up the speed of rotation or by spreading out the beam. The former is not desirable because that is six flashes per minute allows a pilot to miss too far between flashes. Great increase in spread of the beam means loss in beam candlepower. Perhaps it may prove desirable to spread the beam somewhat and maintain present maximum candlepower by using a somewhat

brighter wattage lamp than the present standard, or by using several lamps and several projector enclosures each of which is designed to add its light distribution for the best effect of the beam as a whole.

The latter possibility has led to the consideration of multi-light projectors as shown in Fig. 2. Two long range projectors are provided with their beams offset to increase the effective beam spread without the loss of candlepower. In addition, auxiliary projectors are provided of much beam characteristics so as to ensure a vertical fan of light of relatively high candlepower visible from any location on the upper horizon.

The use of colored beacons, particularly red, was first adopted by the British in great numbers concerning the ability of red rays to penetrate fog.

The higher visibility of white light beacons reported by the Bureau of Standards (maximum candlepower) even during bad weather clearly shows their benefit although it is recommended that they be supplemented by colored projectors for positive identification and cockpit. The night air map of a city is nothing more than a myriad of lights—street lights, lighted building signs, and flashes from automobile headlights, particularly where the streets and thoroughfares are filling. Because of this, when light beacons do not call attention to themselves and are not picked up as set colored beacons which catch both the lights of the city generally and lift them into the sky, the present city lights both clear and colored beams of high candlepower—the fire for the greatest visibility tends to advance conditions, the latter for crash and positive identification of the airport location. Where two or more airports are in close proximity, each airport might be assigned a permanent identifying color.

VARIOUS REFINEMENTS in the design of boundary units are being introduced which show distinct advantages over the early shaded units. Thus from the standpoint of design and the characteristics of certain hazards in event of collision, early practice is that for the spacing of boundary lights from 100 to 100 ft. The optimum practice is that a number of these lights are spaced to cover the beam radius. This is particularly true of airports located adjacent to streets or highways paralleling the boundaries of the field and because of the closer spacing of street lighting units it may be difficult to identify the smaller more widely spaced boundary light sources. Furthermore a pilot passing over one corner of the field may have difficulty recognizing this as a cor-

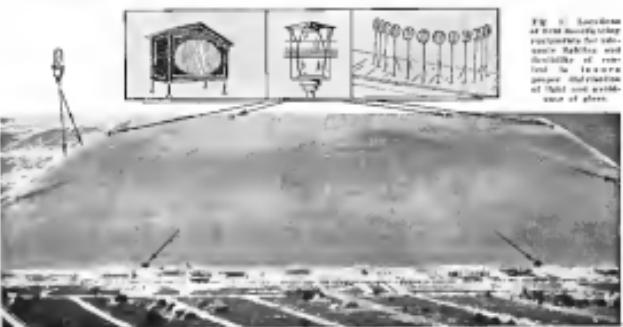


Fig. 2. Illustration of two methods using projector enclosures to achieve visibility and durability of certain aircraft. In the center, the beam is spread by increasing the size of the beam and decreasing the angle of divergence.

ner, this is particularly true under adverse weather conditions when the units are spaced at considerable distances. If boundary lighting units are spaced from 75 to 125 ft. apart a pilot flying over any corner of the field will under adverse conditions at visibility be able to see a sufficient number of the boundary lights to ensure his position with respect to the field boundaries.

The simplest specification for lighting landing fields reduced to the fundamentals applied to other general lighting problems, can be stated in terms of lumens of light, or foot-candles, delivered per square foot of area. This is presented on the generally accepted fact that the best illumination system (at landing, taking off and general operations) provides practically uniform distribution of light over the entire field.

A combination of circumstances has made it seem desirable to mount field illuminating units only 10 ft. or so above the ground, and to attempt to sweep the entire landing area with a fan of light. With such an acute angle of projection, the zone of maximum candlepower must be aimed only the slightest amount below the horizontal plane in order to project light to the far horizons of the field. Under these conditions of projection, the lower half of the beam falls on the field, while the upper half is lost as far as lighting the ground is concerned. With a narrow vertical spread and a sharp cutoff, the upper part of the beam produces in effect a layer of light above the field projected horizontally with the beam. Hence, when the atmosphere is extremely clear, the greater portion of the time since landings may be made over the sun and in the same direction as the projected beam.

Lighting engineers have for some time felt that the most flexible, safest, and most versatile system will require one, preferably two, high-powered units located on each side of the field. Such a system is illustrated in Fig. 1.

Illumination should be made for at least 200 hr of electrical energy for field floodlighting purposes. It is reasonable to anticipate requirements to this extent will also become maximum safety will be dependent on the use of more light, but rapidly for psychological reasons is that the well-lit fields will go a long way to accelerate public confidence in the practicability of night flying interests.

With such a system, as detailed that each unit is controlled individually from a single control panel, the resulting light distribution would dictate the particular units that would be lighted at any instant and therefore it would always be a question of distribution of available light. It will be noted that at 2,200 ft. the vertical illumination is well over 0.5 ft. (upper limit) maximum required by the Department of Commerce, but the horizontal illumination is at the order of 0.006 ft. It would result in a modified beam pattern in order that the light might be directed more efficiently toward the ground.

WITH THE PRESENT ARRIVAL of the opening of field floodlighting equipment the ratio between vertical and horizontal illumination is very variable. The 2 ft. fixture uses illumination measurements taken at 300 ft. and at 2,300 ft. gives a 24 hr 180 deg arcusion field light developing slightly over 2,000,000 lumens/kw candlepower. It will be noted that at 2,300 ft. the vertical illumination is well over 0.5 ft. (upper limit) maximum required by the Department of Commerce, but the horizontal illumination is at the order of 0.006 ft. It would result in a modified beam pattern in order that the light might be directed more efficiently toward the ground.

At 300 ft. the vertical illumination was of the order of 25 ft-candles while the horizontal foot-candles (x) to 0.67 ft-candles. The ground in the immediate vicinity of the projectors appears fairly well lit and favorable for landing, but the pilot has a difficult task in the judgment of where, since he has ground illumination in the point where he grounds the wheel and has the further advantage of high vertical lighting on ground, or words, that indicate the field boundaries ahead.

On the other hand, if he is forced to approach from the far side of the field toward the right, the horizontal illumination is almost negligible (the reading of 0.0065 ft. candles is only about half what one could expect from full moonlight), so that the ground conditions are quite obscure; furthermore he cannot benefit by the vertical

illumination since he is on the dark side of all such obstacles.

Shadows caused by irregularities in terrain or windscreens particularly objectionable, for they are apt to give the pilot a false impression of the condition of the landing area. Small knobs casting deep shadows cause the latter to appear as deep holes or valleys.

These facts should conclusively point to the faulty of trying to light an area as large as an airport landing field adequately with one high-powered projector or battery of projectors; nor is it any more expedient to provide a number of projectors strategically located unless powered to deliver adequate light volume comparable to the area to be lighted.

BEST OF ALL THE ABSOLUTE NEEDLESS OF SWEEPING GLOW AS FAR AS POSSIBLE, THE SINGLE HIGH-POWERED SOURCE HAS BEEN PREFERRED TO THE SYSTEM USING LOWER POWERED SOURCES DISTRIBUTED AT VARIOUS POINTS AROUND THE FIELD BOUNDARIES. WHEN SUCH SINGLE UNITS ARE LOCATED WITH RESPECT TO SWEEPING WIND DIRECTION, THE PILOT IS FREE FROM GLARE THE GREATER PARTS OF THE TIME SINCE LANDINGS MAY BE MADE OVER THE SUN AND IN THE SAME DIRECTION AS THE PROJECTED BEAM.

LIGHTING ENGINEERS HAVE FOR SOME TIME FEEL THAT THE MOST FLEXIBLE, SAFEST, AND MOST VERSATILE SYSTEM WILL REQUIRE ONE, PREFERABLY TWO, HIGH-POWERED UNITS LOCATED ON EACH SIDE OF THE FIELD. SUCH A SYSTEM IS ILLUSTRATED IN FIG. 1.

ILLUMINATION SHOULD BE MADE FOR AT LEAST 200 HR OF ELECTRICAL ENERGY FOR FIELD FLOODLIGHTING PURPOSES. IT IS REASONABLE TO ANTICIPATE REQUIREMENTS TO THIS EXTENT WILL ALSO BECOME MAXIMUM SAFETY WILL BE DEPENDENT ON THE USE OF MORE LIGHT, BUT RAPIDLY FOR PSYCHOLOGICAL REASONS IS THAT THE WELL-LIT FIELDS WILL GO A LONG WAY TO ACCELERATE PUBLIC CONFIDENCE IN THE PRACTICABILITY OF NIGHT FLYING INTERESTS.

WITH SUCH A SYSTEM, AS DETAILED THAT EACH UNIT IS CONTROLLED INDIVIDUALLY FROM A SINGLE CONTROL PANEL, THE RESULTING LIGHT DISTRIBUTION WOULD DICTATE THE PARTICULAR UNITS THAT WOULD BE LIGHTED AT ANY INSTANT AND THEREFORE IT WOULD ALWAYS BE A QUESTION OF DISTRIBUTION OF AVAILABLE LIGHT. IT WILL BE NOTED THAT AT 2,300 FT. THE VERTICAL ILLUMINATION IS WELL OVER 0.5 FT. (UPPER LIMIT) MAXIMUM REQUIRED BY THE DEPARTMENT OF COMMERCE, BUT THE HORIZONTAL ILLUMINATION IS AT THE ORDER OF 0.006 FT. IT WOULD RESULT IN A MODIFIED BEAM PATTERN IN ORDER THAT THE LIGHT MIGHT BE DIRECTED MORE EFFICIENTLY TOWARD THE GROUND.

SYSTEMS OF THIS SORT WHERE THEY HAVE BEEN INSTALLED, HAVE PROVEN MOST USEFULNESS AND DESERVE serious consideration on all airport projects.

THE MATTER OF COST HAS BEEN A DETERRENT TO THE FULL PROVISION OF HIGH-INTENSITY LIGHTING FACILITIES. NARROWLY SPEAKING, BUDGETS ARE NOT PARTICULARLY ELASTIC. INITIAL EXPENSE RELATED TO THE ESTABLISHMENT OF AN AIRPORT HAS IN MOST CASES LEARNED THE APPROPRIATION FOR LIGHTING. THIS IS SPITE OF THE FACT THAT NO ONE DENIES THAT THE SUCCESS AND VALUE OF AN AIRPORT DEPENDS IN A LARGE MEASURE ON ITS LIGHTING FACILITIES. IT IS NATURAL THAT WE MAY EXPECT LOWER COSTS ON EQUIPMENT AS THE DEMANDED SERVICES AND GUARANTEED LIGHT VOLUME IS OBTAINED. ALREADY CONSIDERABLE REDUCTIONS IN COST OF AIRPORT LIGHTING EQUIPMENT HAVE TAKEN PLACE.

FURTHERMORE, AS TRAFFIC GOES ON IT IS REASONABLE TO EXPECT THAT THE COST OF AIRPORT OPERATIONS WILL DECREASE WITH THE INCREASE IN AIR TRAFFIC.

WHAT PRICE

Merger?



By TALBOT O. FREEMAN
Assistant to the President, The Aviation Corporation

THE DEVELOPMENT of aviation has suddenly reached the merger phase of the cycle. This naturally, because other comparable industries have taken decisive and rapid growth in their early cycle phases much earlier than did aviation.

Sometimes it has been erroneously thought that aviation's merger stage has been entirely artificially induced, and that its appearance at this time is out of place and premature; thus, in fact, it is only the child of the brains of certain powerful leaders in the industry who believe they can meet the threat of the small competitor through sheer size and wealth of resources. This absurd notion is wholly unfounded. If anything, the great leaders have tried to induce a period of some relaxation, which would allow aviation to proceed toward a stable and prosperous future on a firm foundation of assured support. In fact, aviation has reached the merger stage at this early period in its commercial history because the great growth process of America has produced an amazingly large number of super-experts who have been all too ready to risk their capital in a pioneering venture. In this way there has been provided an extraordinarily large amount of capital which has produced a miraculously assured of well-established facilities, having not only no definite relation to the rest of the industry, but being even greater in capacity than the present traffic will bear. At any rate, aviation is now going through the merger phase because it wears the benefits of that expedient.

When the merger stage begins, one heard everywhere: "But why should we merge with anyone? What advantage will we gain thereby that we cannot provide for ourselves without relinquishing our independence?" For the purpose of this article we ignore just those questions.

First of all, the early aspirations of aviation enthusiasts were, by necessity, closely proximate. One was an ex-World War flier who could not forget his first love. Another was a mechanical or mechanical genius who had invented a new wing curve or a new type of engine. A third, or financial type, saw the opportunity to make money rather easily on Government contracts. Still another, who knew all about some other business, was intrigued with the possibilities of this newest industry about which he knew less than nothing, and so on ad infinitum. As a result, practically all companies to date

have one trait in common, i.e., they lack sound management. One company has made big money in aviation for years, yet today it has no engineering department worthy of the name. Another has barely a semblance of real production methods in its shop. The one accounting system of sheet metalists is subtracting the year's expenses from the revenues, and dividing by the number of planes sold. The fact is that the whole industry is in almost total ignorance of scientific market analysis. I am speaking now, of course, principally of the smaller independent companies.

ABOVE ALL ELSE, THERE, NARROWS OF THE RIGHT SORT MEANS THE ACQUISITION OF EXCELLENT MANAGEMENT. WATCHING THE AUTOMOTIVE INDUSTRY CAN, THE MACHINE tool expert, the cost accountant, the marketing specialist, and the well-trained engineer standing in line to buy tickets for the big aviation show, brings a great sky of weariness stretching out before a direction of flight in the clouds after the storm. And, said you, it is ignorance from whom experienced bankers which has forced into the large holding companies certain executives who recognize lack of knowledge and who are willing to pay a premium price for a plant or a firm. Furthermore they know where to go to get the men they need to correct the discrepancies.

The purchaser has filed a most useful proposal, for only he could have had the vision and belief to stick to the job during the mounting process. Now, however, he must put himself a partner or pride, for the acquisition is the key for him to survive without the last word in modern methods. Some men who have the prospectus spent good execution as well, but only after long years of struggle and training in good, experienced hands. Those in the industry who now find themselves in a bind and do not know which way to turn, cannot afford to argue too strongly to seek a helping hand without understanding. Otherwise, however, inadequately managed companies usually do not prosper, and their mistakes are often the cause of their ultimate ruin.

Next in importance comes the question of research and technical advice. No one small company can afford to maintain a high grade technical staff, covering all phases of engineering and management; nor can it build and maintain costly laboratories and equip them with all the modern facilities necessary for complete investigation and analysis. This activity is much more im-

portant in the early stages of a new industry than later on. Innovations, new developments, and new methods are flooding the aviation business almost daily. Those who are prepared to take advantage of this situation will emerge, ten years from now, with flying colors; those who are not, after struggling a few years, to market a permanently obsolete product, will simply expire of starvation. To complete the picture, let me mention just a few recent developments which merit the closest attention on the part of everyone, but which are quite beyond the scope of the average aircraft company today. (1) Diesel engines; (2) Blended wings; (3) Large construction; (4) Jet aircraft; (5) Adaptive landing gear; (6) General propellers; (7) Autogiros; (8) Drones; (9) Composite materials; (10) Flying multi-bladed single engine aircraft on a given lead; (11) Comparative costs of operating engines at low speeds with subsequent overhead vs. high capacity operation and frequent overhaul. Etcetera.

At this point we must not overlook technical assistance of another sort, namely, that which has to do with administration, and that which concerns Public Relations. In discussing the former let us borrow a leaf from the book of one aviation's largest and greatest holding companies:

The management will emphasize the necessity for decentralized operations and responsibilities, with coordinated control. Such a policy is essential to an organization comprising a large number of separate and distinct operating divisions in all branches of aviation activity. Each branch being a highly specialized business in itself . . .

"Each division will be a complete corporation in itself. It will be tied in to the Corporation largely through accountability only. The head of each division must assume full responsibility for the successful operation of that subdivision; his function being at the same time tributary to the success of all of general management, i.e., operation for the benefit of the customer to whom the corporation owes its existence. Since it is only through service to the public that profit to the owners is assured, this makes us more concerned with the broader needs of public service"

"The Executive Committee will be guided largely by the advice of the active executives of the company, who, in turn will have available at all times the results of the surveys and investigations of a complete and competent staff of technical experts. Not only will laboratory research by this staff be emphasized but also there will be formed committees comprising leading executives of the various divisions encompassing each separate branch of aviation activity, such as Transportation, Traffic, Airways, Equipment, Aircraft, Accessories, etc. The latter committee will serve as clearing houses and sources of information for the various divisions operating in a given sphere. In other words, it is the Corporation added to the accomplishment of its purpose by the cumulative assistance of all divisions, but each division, in turn, must benefit by the experience of each other division. Finally, only by means of a corporation of broad scope could

the lesser companies hope to maintain research laboratories and a technical staff. In this connection, it should be pointed out that an accurate presentation of facts greatly facilitates the agreement of many minds of different opinions. Disagreements tend to grow in proportion to the degree to which facts may be substituted for opinion, and agreement of, of course, the heart of coordinate control."

THIS ABOVE PARAGRAPHES read almost like an essay of Roosevelt's. Considerable business acumen and broad understanding of the aviation industry have dictated those words. With all the spirit and enthusiasm behind a sense of responsibility, it is hard to imagine anyone but the finest of morale, loyalty, and enthusiasm; and economy is ever any stronger than it is personal. Nor are my words, wholly independent, carrying powerful weight and sustain such broad and stimulating concern in the industry.

Regarding Public Relations, the subject is altogether too broad to allow an extended discussion here. However, suffice it to say that with state and federal agencies not only regulating aerostatic activity, but also increasingly establishing new facilities, the aviation industry must be prepared to co-operate with these governmental agencies to the fullest possible extent, if it expects to attain what it wants. Small, uncoordinated, unorganized, and widely varying interests only hinder their department. On the other hand, strong, consistently repeated, and above all honest and intelligent operators not only help but even encourage.

An example of what can be accomplished by a well coordinated program, let me quote from a resolution recently passed by the Western States Governor's Conference, held at Salt Lake City, Utah on Aug. 22, 1948. This conference was called following the Western States Air Commerce and Aviation Conference held at Boise, Idaho, on July 8-10, 1948.

"Whereas, the Western States Aeronautics Association, comprising representatives of the Governors of the eleven Western States, was organized at Boise, Idaho, July 10, 1938, for the purpose of promoting air commerce in the West and with the following objectives:

1. Uniformity and flexibility in legislative measures
2. Adoption by the State of the regulations promulgated by the U. S. Department of Commerce
3. Establishment of State and interstate airports in close coordination with the Federal Airway system; uniform airway markings; reciprocity between States relative to licensing of aircraft, drivers and aviation

"Now, therefore, be it Resolved that this conference endorses and authorizes and its purpose and urges the active support of public officials and those engaged in the industry, and particularly repeats these states that have not already appointed representatives of said association to take immediate action by making suitable appointments."

Here then we find the result of cooperation in the highest degree between state governments, the Aero-

ospace Branch of the Department of Commerce, the Post Office Department, the U. S. Chamber of Commerce, the Army Air Corps, the Bureau of Aeronautics of the Navy, the Aeronautical Chamber of Commerce, the National Aeronautic Association, and the industry at large. What more could one ask? Undoubtedly, to prevent confusion, flexibility, to furnish irrevocable action. A pretty picture that, and one which hardly will be the future prosperity of our industry.

True, the associations mentioned above played a major part in the splendid accomplishments of the Illinois Conference; however, some of the most important helpful discussions were advanced by experts invited to the conference by large interests. Over the long haul, Congress could easily afford to retain competent talent capable of handling such work. Above all do not confuse this activity with old fashioned "lobbying." Nor does it in any way smack of thought monopolies. In fact, every industry must protect itself against those who might misuse it, either maliciously or through plain misinterpretation. No industry can long remain healthy and robust when destiny is left entirely in the unscrupulous hands of those who are assigned to the task of regulation. Competition is the life of trade. There is plenty of it today in aviation, which means that the industry will be healthy, lively, and rapidly developed for the best interests of the general public.

Let us return to the part merges play in the discussion of dualized aircraft. In the refinement of existing aircraft, larger manufacturing companies must have a general manager, a production supervisor, a sales manager, a purchasing agent, a chief engineer, a chief accountant, and various other highly paid individuals who are strictly "overhead" personnel. These they must have, whether they make one or one hundred planes per month. Overhead, in some aircraft plants, has run as high as \$20 per hour of direct labor costs. Obviously, this heavy and comparatively fixed burden can be greatly reduced per plane by increasing the number of units manufactured in a given plant. There are many other savings contingent on increased production, but this example will do to bring out the point. For instance, if the production is a factory outfit is increased tenfold, and "General Overhead" removed the same, then the cost of production of each would be very greatly decreased per unit.

It must be clearly understood that no company, however, large or small, could possibly long survive and prosper if an inferior product were constantly foisted on several of its transport subordinates by one of the manufacturing units under its control. However, it is almost necessary that such a condition could exist in the presence of good management. I believe we may safely assume that an extensive system of consolidated mail, passenger and express lines, together with flying schools and other services must needs provide the outlet which will allow a manufacturing system to increase its production and hence reduce costs. The argument as far as mail and express lines for civilian use goes, but the fact still remains that consolidation with a greatly enlarged concern necessarily means elimination of duplicate effort, savings is demand for a given product, and ultimate reduction in costs to the public, both in transportation service and aeronautical products. This, then, is one of the greatest advantages in merging the interests of several concentrated concerns.

We have now enumerated the most obvious advantages

"The Big Four"

Curtiss-Wright Corporation
Curtiss Aeroplane & Motor Company, Inc.
Curtiss Aerotors Corporation
Curtiss Flying Service, Inc.
Curtiss Aeroplane Export Corporation
Curtiss-Lycoming Corporation
Curtiss-Rutherford Aeroplane Mfg. Co.
Wright Aeronautical Corporation
Krebsite Aircraft Corporation
New York and Suburban Air Lines, Inc.
New York Air Transport, Inc.

United Aircraft & Transport Company

Boeing Airplane Company
Pratt & Whitney Division
Sikorsky Air Service, Inc.
Pratt & Whitney Aircraft Corporation
Cessna Flight Corporation
Sikorsky Aircraft Corporation
Hamilton Standard Company
Hawker Aero Manufacturing Co.
Stevens Aircraft Corporation

The Aviation Corporation

Universal Aviation Corporation
Colonial Airways Corporation
Peninsular Airlines Corporation
Endy-Endy-Aviation Corporation
Research Field, Inc.
Southern Air Transport, Inc.
Interstate Air Lines, Inc.

The Detroit Aircraft Corporation

Aircraft Development Corporation
Aviation Tool Company
Auburn Aircraft Corporation
Beechcraft Aircraft Corporation
Grumman Aircraft, Inc.
Lockheed Aircraft Corporation
Merle Aircraft Corporation
Parks Air College, Inc.
Ryan Aircraft Corporation

of consolidated or merged aeronautical interests, but what of the objections? There are two interested parties whose opinions and desires we must respect, i.e., the aeronautic themselves, and the public. What price paid must these of them pay? Frankly, I am far from absolutely certain in regard to which of these two interests can be said to jeopardize the best interests and welfare of either party. There are, of course, exceptions which are outside the rule. We must also forever contend with shoddy dealing and questionable shadier motives. However, a similar warning applies all through the activities of this long world of ours; it has as particular significance here.

Local pride in membership is about the only price the large guys, the public, whom the industry aims to serve, pays nothing; yet pays its share of the reward. That is exactly as it should be.

CERTIFIED PERFORMANCE AND Safety Ratings

THE ADVERTISED PERFORMANCE data of the wide variety of commercial aircraft at present offered for sale in the United States is, in general, inaccurate. Landing speeds and roll after landing are usually understated, and top speeds, initial rates of climb, and ceiling are usually overstated. The difficulty is regard landing speeds has been thoroughly analyzed by Elton G. Read in an article which appeared in the July 20 issue of AVIATION. In that article it was shown that the KLM airplane 25 was flying with excessively low landing speeds. The situation is little better in regard to other performance characteristics. The manufacturer's condition may be due to a number of causes.

First: There are very few test pilots in the United States who are competent to quickly, accurately and intelligently run a complete set of performance trials. The performance data on Government aircraft has long been accurately determined and Government experience has shown that the average expert pilot requires thorough training usually under the supervision of an unpowered engineer, before climb, speed, and other performance figures or curves obtained by him, including opinions on stability, maneuverability, aerodynamics, etc., can be considered accurate and of real value. The training period often exceeds over a period of six months of intensive flying, during which time the work of the embryonic test pilot is duplicated and checked in every detail by a test pilot of recognized experience.

Recognition and analysis of such characteristics as a tendency to auto-rotate or of catastrophic instability (stable or inverted position) requires some general flying experience and much experience in test work. Intelligent opinions regarding controllability, maneuverability, stability, maneuverability, vibrations, structure, comfort, suitability for purpose and recommended changes

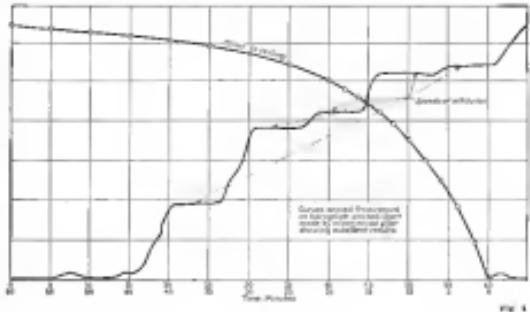
are as much a part of the results of performance testing as is the determination of climb.

Second: At present performance trials are run by individual manufacturers over their own courses with their own barometers, stop watches and other instruments at widely separated parts of the country under widely varying conditions. As a rule the test pilot who runs the trials is temporarily engaged in the employ of the manufacturer, sometimes he may be more concerned with meeting the manufacturer's wishes and expectations than with obtaining accurate data.

Third: In some instances deliberate distortion of facts is undoubtedly resorted to for advertising value.

Fourth: A general approximation of the significance of performance data as obtained by trial does not exist. In many instances advertised figures are based on performance or on wind tunnel data.

Fifth: No standard procedure for conducting such trials is in use. Roll after landing, for example, is frequently advertised but rarely is the wind velocity at the base at which this roll was observed stated. Climbs are often and laconically shown with the words "light," "medium," and "heavy" but never accurately obtained. It is virtually impossible to ascertain just flight at altitude without the aid of an altimeter or any other equipment, and it is necessary that the full speed at each specified altitude be measured for at least, say five minutes before minute variations are eliminated. In

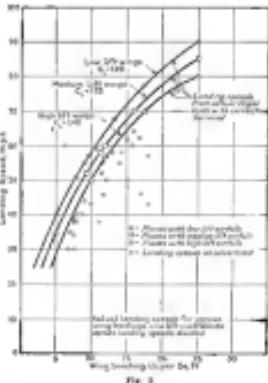


TRIALS

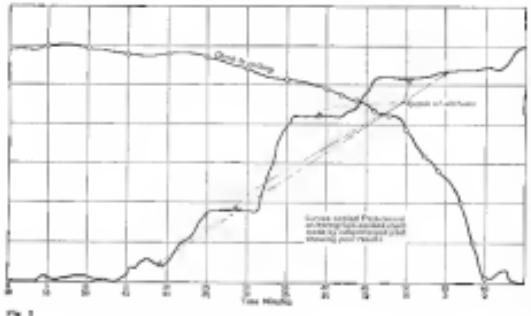
By LIEUT. COMDR. FRANK WEAD
The Aeromedical Safety Survey Company of America

turning to the airplane a series of top body checks should be run to determine the speed of head, chest at those altitudes. The results should be collected in turning the strength check curve to writing. It should be necessary to point out that for fair comparison with other types and for a true measure of the value of the airplane all performance data should be obtained with the airplane loaded to its specified full gross weight, and that the same propeller setting should be used in all tests. Accurate weighing is necessary to determine the weight of payload and tank capacity and the full gross weight should be checked before every trial flight. There are several recognized methods of obtaining landing speed, at which the photogrammetric method is perhaps best, subject to error.

In each of the various trials that go to make up complete performance trials, a fixed standard route and altitude should be universally adopted. The conditions under which each test is to be run should be necessarily defined in detail, so order that all trials may be run on the same basis, and a standard procedure should be laid out and followed. For example, if it is believed that landing speeds, time and distance of take-off and roll after landing without braking should be obtained, for universal use comparison under a "no wind" condition, and that the idling rpm. of the engine should be used and recorded. Little or no attempt has been made to



standardize endurance trials. It is suggested that the endurance should be measured in hours and in miles, as (a) full power at 12,000 ft, including climb and (b) at cruising speed at 20,000 ft, including climb, and that the cruise control should be laid out and maintained. The full power test represents perhaps the minimum endurance for the type, and the test at cruising speed represents perhaps the maximum under average operating conditions. The average rpm. fuel consumption in gallons per hour and oil consumption in pounds per hour, and the average air speed meter reading (corrected) should be recorded. The distance flown should be obtained by each flywheel timing device, the average air speed meter reading (corrected) and the cruising speed should be decided upon after considering the air speed meter calibration curve (air speed vs rpm.) of the airplane and the fuel consumption curve of the engine at engine. There are many very



(continued)

troublesome details in connection with almost every item of performance testing, neither of any of which may render the data obtained inaccurate or useless. Printed forms for recording observations in flight and for drawing up test records are of great assistance in this regard. It may also be noted that, as the interests of economy, the equipment and comfort of the test pilot is worthy of serious thought. Correct readings at altitudes are rarely made by a pilot who is suffering from cold or lack of oxygen.

If the plan outlined above is adhered to, the final step seems to be that both trials should be run and results be furnished the manufacturer by an outside, unbiased, independent agency, having no axe to grind, except the necessary prompt and careful determination of performance data and evaluation of the aircraft. Such an agency should employ highly trained, experienced test pilots of recognized ability, should utilize the best instruments and other equipment obtainable, and the work of each test run, including that of computers and technicians, should be supervised by an aeronautical engineer.

At present there is a great variety of aircraft types in every class. These aircraft, before being placed in production, have passed the inspections of the Department of Commerce. The prospective purchaser, however, has no ready method of determining which of these types are really high class and consistent in every way and which of them barely meet the Department of Commerce requirements. It cannot be denied that some of the airplanes flying today have their weak points and that others could be considerably improved in design or

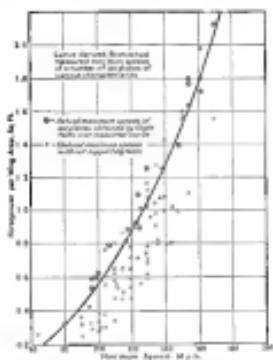


FIG. 1—Comparison Between Maximum Speed Characteristics of Airplanes and Ratio of Power to Weight. This ratio can be demonstrated to be the principal factor determining the maximum speed of an airplane. The addition of the major points to a curve shows a continuous, strong, with the frequency showing at all points more scaling planes and techniques enumerated in this

structure. The Department of Commerce is primarily concerned with passing planes which exhibit a prescribed minimum and rejecting those which do not. Safety ratings have been prepared as a means of determining the varying degrees of excellence of aircraft, much as Lloyd's ratings classify steamships.

SUCH RATINGS should be based upon the following studies, analyses, tests or investigations: history of design; detailed specification of the airplane; aerodynamic characteristics; stress analysis in all flight and landing conditions; static and dynamic tests of materials and assemblies, including air loading; X-ray analysis; fatigue, durability, strength, fatigue, durability, load factor, investigation of loads in the engine, propeller, and undercarriage; flight tests to determine stability, maneuverability and controllability; determination of center of gravity with various loadings; safety features; selection of materials, manufacturing facilities, workmanship, supervision and inspection. The methods and procedure for determining such ratings should set forth the tests or investigations to be carried out under each of the above headings, including the basis for stress analysis, safety factors deemed necessary, and such information, and the number of results should suffice recommendations leading to improved designs or structures and to improved production. Such a procedure would result in rating the aircraft as a type, and the information gained should be of considerable value in investigating individual aircraft to the manufacturer, and in insurance and finance companies in conducting claims work. A fresh conception viewpoint is a valuable aid in engineering and production improvement.

Some classification is necessary and the following is suggested. A rating of A-1 for the best types, followed in order by the ratings A-2, B-1 and B-2 within the following classes:

- Class 1: Single-engine, 3,500 lb. or under
- Class 2: Multi-engine, 3,500 lb. or under
- Class 3: Single-engine, 3,500 lb. or over
- Class 4: Multi-engine, 3,500 lb. to 7,000 lb.
- Class 5: Multi-engine, 7,000 lb. or over.

Where no aircraft has been rated as a type, or performance data has been compiled in a manner sufficient for this purpose, it will be necessary to rate the airplanes of this type as soon as possible during production, so if changes are made, additional tests would be run to determine whether certified performance data or the safety rating should or should not remain effective.

Individual aircraft would be rated after the investigations leading to a type rating are complete, by the supervisor or inspector who works for the rating organization, or the manufacturer's plant who would then ensure that the standards of a safety rating are met on each and every airplane of the production program. Such individual aircraft safety ratings should not be effective for, say, more than three months. At the end of each three month period the airplane should be inspected in service and the rating plate if the airplane has been maintained to a satisfactory condition should be renewed for another three month period or canceled.

An airplane as the one shown will not rest entirely upon the integrity of the organization operating it. Laboratory, wind tunnel, and other research and tests, analyses and trials must be thoroughly carried out, and the opinions of consultants of recognized ability must be obtained when necessary.

HANDLING Personnel IN THE AIRCRAFT FACTORY

By ELWOOD D. ULLMAN, JR.

HOW TO HANDLE the hundreds of job-seekers who besiege the airplane factory each week, how to serve the lost-sold workers for the vacancies that come and how to keep the employees in a happy, enthusiastic frame of mind so as to insure the most efficient production are among the many important problems confronting executives of the present day airplane factory. Methods used by the Ryan Aircraft Corporation, St. Louis, makers of the single-place Ryan Brougham, have proved highly successful, and its employees are noteworthy for their high morale and low turn-over.

The plant is about a year old, production having been started last January. It is located in the northeast portion of Lambert-St. Louis Field, site of the Municipal Airport, and consists of three buildings. There is a main factory building with dimensions of 380x75 ft., a smaller assembly plant, measuring 130x75 ft., and a two-story office building between them with dimensions of 30x50 ft.

At the time this article was prepared, the personnel of the Ryan company totaled 172, of which 167 were in the factory. The number of employees is increasing as a result of accelerated production. The factory personnel, by departments, was: metal workers, 15; welders, 22; sheet-metal workers, 16; wood workers, 25; painters, 4; workers in covering and damping department, 14; spotters, 4; and assemblymen, 26. Apprentices, helpers and qualified labor receive an approximate hourly wage of 30 cents. Skilled workers, such as welders, metal workers, wood workers, etc., average about 75 cents, and workers with youth experience and unusual abilities are paid around \$1.

Included in the factory is a group of eight girls employed in the wing and fuselage coating department. The work does not demand the services of a skilled mechanic and, in fact, officials have found that girls are more adept at it than men. Most of them have received



Final assembly line at the Ryan Aircraft Factory in St. Louis

experience in handling dress patterns and power sewing machines so that they may be readily trained to apply their knowledge to airplane requirements.

Upon Albert G. Tindale, the factory superintendent, devolves the task of solving the employment problem. As any airplane manufacturer will attest, it is no small problem. There are so many applicants for work that Mr. Tindale could devote all of his time to interviewing them and answering their letters. However, he has reached an effective solution with the practice

All visitors entering the main office are confronted by a young lady who asks their business and directs them to the proper official. This young lady is not only an information clerk but, in effect, an amateur employment manager. Job-seekers are handed a printed application blank and directed to fill it out at a nearby table.

As a general rule, the applicant appears after he has filled out his blank and deposited it with the young lady. He is told that he will be notified should his services be required. However, if there are any vacancies, the young lady will inform any body-appraising man who seems well qualified to fill the opening. These applicants are interviewed by Mr. Treadle and if a man is deemed acceptable, he is instructed when to report for work. Instructions concerning any vacancies are given the young lady by Mr. Treadle each morning.

Experience in dealing with job-seekers enables the young lady to weed out ill-qualified workers from the others so that Mr. Treadle does not have to waste any time with the obviously unqualified. The young lady goes and finds her the chosen one, even though she has been told that the applicant is particularly unsatisfactory. This is done to enable the firm to engage an extra hand when needed. In case the applicant is continually procrastinating and there are no vacancies, room is made for other business.

The application blanks are turned over to Mr. Thaddeus daily. He goes over them, selecting the most interesting. Reports from these blanks are transferred to cards which are kept in a box on his desk. These cards are assessed and arranged according to occupancy so that they may be quickly referred to in the event a need

areas. They are even graded "good," "Fair," etc., so that the most likely significant can be given first call.

Sometimes a man will be given a practical test to aid in grading his application card. A welder, for instance, will be asked to stop back into the shop, take a torch and do a small piece of work. The foreman reports to Mr. Tindale concerning the ability shown and the proper notation is made on the card.

Cards are not made out for all application blanks as many of the latter plainly show that the would-be

employee has no place in an airplane factory. All letters requesting work are answered by a polite form letter regretting the lack of an opening and stating that the applicant's name has been placed on file. In case the letter is from a man of unusually high caliber, an experienced superintendent or an executive, he will be personally answered by Mr. Trindale.

As soon as a name is engaged, his application card is transferred to another box which contains the records of active employees. Here the cards are arranged according



Course of the writing department of The Water-Mill
in 2006 closed.

card is turned in once a week. It lists the number of each employee together with the number of his jobs worked on and the time consumed on them as well as the total number of hours and the amount due. This departmental time card is compared with the time-clock card and in the event of a discrepancy, a conference is held to rectify the matter at issue. The work ends Wednesday and employees are paid by check on Saturday.

In order to encourage an orderly appearance about the plant, employees are required to wear a uniform overall bearing the word "Boys" on the back. These overalls are purchased in large lots at low prices by the company and are sold to the employees at cost. Soiled overalls are picked up once a week by a laundry, the employees paying for the washing. Personal articles of apparel and belongings are kept in lockers, the company furnishing all large tools but the smaller, every-day tools are supplied by the mechanics, each of whom has his own kit.

A registered name is kept on the premises at all times to meet liability. A small deficiency with the name in charge is located in the office building and employees may report there for first treatment. The name's hours are from 8 a.m. to 5 p.m. In the event of a emergency, the field physician or a physician in Peoria, Ill., can be summoned as a first treatment. As a rule, all cases requiring such first-aid treatment—such as sprains—are sent to a physician's office in St. Louis. An individual holding by some emergency agent, if



Some circuits providing self protection against effects
where all circuits receiving three line
signals receive one additional

considered for this purpose, an ambulance being maintained on the premises. According to the sum's records for an 11-month period ending August 12, 99 cases were treated at the dispensary. Most of these were slight injuries and it was necessary to send but 18 of the patients to the physician's office in St. Louis.

In addition to the factory service's mentioned above, the plant also employs one chauffeur, two watchmen, four storeroom clerks, one shop maintenance man and four factory porters. There are five engineers two superintendents and one tax patroller. The sales and advertising department has a personnel of five and the finance department, twelve.

THE BENEFITS OF A

Finance Service TO AVIATION

By A. O. HUNSAKER
President, Aircraft Finance Corporation of America

WHEN THE NEWS SERVICES of the Nation blazed forth the word that the first organization had been formed to finance aircraft worldwide sales in much the same way that General Motors Acceptance Corporation and other national companies finance automobile "paper," telephone calls were, letters and personal visits very frequent, indicating that a substantial demand existed for just such a company.

The fact, however, that in aircraft financing there were additional complications, exclusive financing of the manufacturer, distributor, dealer, pilot-purchaser and even, under proper circumstances, investors and patentees, brought forth a host of inquiries as to "how it works."

At the request of AVIATION we will outline the function of a complete financial service as it affects various branches of the flying business, taking them in single steps, from the manufacturer's end:

"Let us assume, then, that there exists such an organization as the Blisk Aircraft Company, building a plane that sells for \$15,000. That its plane is an all-superior type, powered with an engine which costs only \$1,000. That it is the last word of airplane that can be foreseen at present; any stage of the transaction because protection against loss of the delayed payment is exercised to the usual conduct of any financial institution.

The Blisk Aircraft Company removes a distributor from a large transportation company for six of its planes, a total cost of \$90,000. Other contracts are on hand. The company can issue borrowed capital, in fact, it needs such capital, because it cannot collect until delivery is made. Under such circumstances the manufacturer could make application for a very generous share of what the planes cost him to produce, possibly he could secure all of the funds he needed for such a purpose, assuming that the financial stability of the buyer and the value of the contract were definitely fixed and worthy.

The distributor, to use a term, is an assignment of the finished planes to the financing corporation plus the bills of lading for ultimate collection.

Manufacturers and airplane manufacturers do not make their own engines and likewise engine cost considerably money, they might not infrequently occur some such situation as this:

Jones builds engines which he sells to manufacturers for \$1,000. The Blisk Aircraft Company contracts for 1,000 of them, an aggregate cost of \$1,000,000. Both aircraft and engine builder lend themselves; the use is

deficit within a specified time, in satisfactory condition; the owner to pay upon acceptance.

The builder of the engines wants \$75,000, so he can proceed. He will submit to you that on the same basis as a hypothetical plan holder on the credit outlined above, The defendant would amount to the same thing. Only, in this case, upon delivery of the finished engines, the lending corporation might try to the aircraft builder, putting it freely.

"There is no necessity for you to pay cash for these engines. We will pay for them, and you now owe us \$1,000,000 plus charges. You use your money for building airplanes."

Throughout the life of the loan to the engine builder there is a likelihood that technical experts of the finance corporation would inspect the plane and see that requirements were met and specifications rigidly adhered to. Misgoverned flight might be introduced, if conditions called for it.

Now we are back to the Blisk Aircraft Company again. They have used the 1,000 engines and built 1,000 airplanes, and now they wish to sell them. Some have been absorbed on contract purchase, others must go to chartered.

In the past it has been necessary for the distributor to pay cash even for flying planes for display purposes. If the manufacturer could only make it possible for him to make his money go further, he would be able to start a more representative line. Here, then, is how aircraft distributing renders a further service to the manufacturer. It provides him with his best selling argument, because he can offer the distributor four to five times as great a buying power for a given amount of money.

"Pay me early 20 per cent of the wholesale cost," he tells the distributor, "and I'll only charge you 20 per cent."

Of course, in such cases the planes are understood to be for display purposes only and are not to be demonstrated, nor flown. Charges for such a service are most reasonable.

But we are getting into the distributor and dealer problems, and they had best be reserved for later.

Within the store premises at the wholesaler's right be said to be the patroon and receiver. His problem falls well within that boundary because, after all, what he strives to become is a manufacturer. There is a distinct place for the financing corporation in this sphere also.

The patroon, instead of wandering from pillar to post

attempting to interest someone in his product, can visit the financing corporation's technical staff and very quickly win assurance of financial assistance, if what he has patented or invented is a practical and marketable article.

Then he is saved time, energy and money—the majority of himself or becoming part of a separate company, securing a selling corporation to raise money, finding markets, etc. The financing company, if it accepts his problem, does the organization and promotion work through its own staff, and its compensation is an interest in the business. In more cases it might entirely, or largely underwrite such a business. The chief difference here between how a financing corporation would handle such a case, and how it ordinarily would be handled, is simply this: the product must stand up under the use of technical experts before anything will be done, whereas an unscrupulous promoter might accept any kind of a "gadget" as a foundation for a securities issue.

And now, regarding the distributor and dealer.

Engaged in the business of manufacturing very light pressure aircraft, Jones wants to be syndicated to that of a Cadillac, Lincoln or Buick-Royale dealer and dealer who has to pay cash to fix his cars. One can imagine how space the display rooms on Automobile Row would look if such were actually the case. And one can understand, at the same time, why most distributors and dealers of airplanes show such an unrepresentative line of whatever craft they happen to represent.

THE BUSINESS of financing the distributor and dealer in the aviation world is just as important, if not more so than the patroon, and at the same time profitable, basis, of financing the automobile men. A very acceptable plan has been worked out in behalf of these "middlemen."

Approach as the financing process is largely a link between manufacturer, distributor, dealer and final purchaser, the "opposite" is the distributor and dealer is generally through the manufacturer whose products he represents. However, that is not vital, the distributor can act for himself directly, if he chooses. In either event, the machinery is the same.

Various agreements affect the working arrangement, as between the finance company and the manufacturer; as between the finance company and the distributor; as between manufacturer and distributor, and so on. But all is summed down to this:

John Jones has the distributorship in a given territory



of a certain manufacturer's airplanes. Various models are produced, but Jones cannot afford to keep more than two or three hours because he won't pay cash and he finds the funds necessary to place a complete stock on his hands.

Through financing arrangements, he can spread his cash for three times farther than if he suddenly goes for only 20 per cent in regard to a 90-day finance of a straight legal rate of interest, plus a very small fixed charge for book-keeping.

At \$100,000 worth of stock.

The first requirement, naturally, is the establishment of a wholesale line of credit by the distributor as dealer. A financial statement must be filed. Assuming the granting of the credit, the business thus powered under the laws of the state in which operations are being carried on—either under conditional sales contract, or chattel financing terms.

The second major financing privilege may be extended as additional series of time open requests, and the fees payment of the distributor covers storage, freight, handling, docking, advances, etc. Interest charges cover, in addition to interest, insurance coverage, bank and exchange charges.

Obviously, it is not necessary in the case of the dealer and the distributor, to cover with insurance the many risks that would be placed were the credit to be used in delestinations. For flighty purposes only, for instance, it is sufficient, but it is understood that the dealer or distributor will not take the plane off the ground during the life of his contract, or lease, without insur-

bank and an advance, notifying the financing corporation.

If the manufacturer can extend credit terms to the distributor, the distributor can extend them to the dealer. By the same token, the dealer can carry the hypothecary on another step to the pilot purchasing the plane.

The various layers can appreciate what such a service will mean in the progress of aviation. Manufacturers can rest assured of a greater absorption power through distribution and dealers, and the psychological effect of many airplanes on display, instead of the usual single plane, will be a mighty influence in exciting sales.

There have been many arguments during the past few years as to the worth of installment purchases, as contrastive to pay for something in the future that cannot be paid for out of pocket savings. But the upper-pantry of America would seem to like the alleged dangers of buying as safe as basic. Reasonists may argue that this is a land rich in natural resources and would be prepared, anyway. They may argue that we are a naturally energetic, progressive nation, or that the war debts of other nations are going up gold on our shores.

But the fact remains that other nations are energetic, that others have great natural resources, that others have enormous collections coming in free debt services. About the only factor not common to some or all, is installment buying, developed to its ultimate only in the United States.

How many of 100,000 automobileists, against salary, those in other lands, have car loans, are released from bondage by washing machines, washing dryers, and electric refrigerators bought on the "Install Day" basis and maintained by regular purchase the same way. Locomotive engine houses where installment purchasing is not the rule, and because part of our daily lives, where they are.

In other words, everything is capital, and we own more when we can pay for it gradually than we would ever own if we had to pay for it all at once.

THIS PURCHASE OF AIRPLANES for purely sports purposes is now reaching greater and greater proportions. Most of the sports flyers want good planes. They expect to buy them, and the manufacturer who does not see a position to have them thoroughly in practice as regular flying pilots, and then has no knowledge that the men above them are flying is right. For every one that can pay \$10,000 cash for such a plane there are thousands that can pay \$3,000 in cash and the balance over a period of time.

What we hold back producers until these men have accumulated the cash, and under we keep these men from developing a broader flying spirit? Finance corporations are organized to make it possible for the manufacturers to build more planes with variety of size, for the dealer and distributor to stock more planes with a great amount of money, for the finance plan-purchaser to buy on terms. And such a service, perfected here in the United States, can be far toward putting aircraft in our cities and making the airplane most art-minded in the world and the best perfected in the world.

It has only been within a comparatively recent period that financing of this type was possible. Insurance rates had to be worked out on a basis that did not make for positive costs; there had to be some official recognition of law rights so that both buyer and seller would know just where they stood in the transaction. But this

is an adquate country, and both these obstacles have been wholly or partially cleared away.

When a man buys an airplane, now, on the installment basis, the financing company rendering a service which makes such purchase possible, is protected against loss on deferred payments not only through prior lien on the purchased plane, but also by email, fire, windstorms, tornado, confiscation, embankment, and theft insurance of a single interest type. And the cost is financed right along with the craft.

This cost is no longer prohibitive. It can be as low as 6% per cent of the deferred balance. An \$8,000 plane, for instance, on which the buyer had paid down \$3,000, could be insured in favor of the financing company for approximately \$300, including the risks outlined above.

BY AND FAR THE only one aspect of aviation, only one point in the picture where installment buying will make it easier for purchasers. There are commercially trained planes to be considered, with engines, possibly, of manufacturing short-run basis in territory not now served by regular schedules. Then are the transportation companies themselves who might want to add to their equipment without having to turn to cash except on hand which might be required for other immediate needs—a sort of equipment-trust service. Aerial photo services; certain dealers, private investigators, wheelmen, and many others need financial assistance at one time or another.

Then there is another side to aircraft financing besides that of the manufacturer, distributor, dealer and pilot-purchaser, although these are certainly the most important. Aviation has many ramifications which call for high cost outlays of cash. The buying of proportionate airways, the installation purchase of engines to replace worn-out power plants, financing regular jobs on several planes at a time, the cost of building of flight which might be beyond the immediate means of the repair shop, and the underwriting of installment paper in connection with aviation supply house sites. These are but a suggestion of what such a service can do, and have broadened my scope.

Precisely few men in aviation are not aware of the fact that the Aeromarine Chamber of Commerce, sitting in with the Aeromarine Branch of the Department of Commerce, has a committee of experts who have worked out a plan feasible for its recommendation for application to installment purchases of aircraft. That plan makes it no longer compulsory for the pilot to show a 50% of ownership, it may be ownership subject to lies. It also removes from the financing corporation, liability for the acts of the pilot. And there can be no influx of foreign capital to set up dummy companies for gaining control through other than legitimate financial channels. That is sound protection for both the buyer and the seller.

Where a pilot used to be unable to have his plane registered in his name, or leased on his behalf, unless he owned the plane outright, he may now obtain such registration through the Department of Commerce, with the exception that "Subject to lessee" is rubberstamped across the face of the license card.

So one need not longer to buy an airplane. All that is required is a small down payment. The balance may be paid over a period of six months, ten months, or even a year. The finance company is ready to make all the arrangements. The present rates of interest are reasonable, insurance is no longer a bugaboo looming large in dollars.



High Speed AS A SAFETY FACTOR IN THE AIRPLANE

By J. DUN ALEXANDER
President, Alexander Aircraft Co.

FEW PEOPLE realize the advantages of airplane speed from a safety as well as an economy standpoint. Providing no large sacrifice is made in losing speed, structural strength or aeroplaneability, the fastest plane in the safest plane. It spends little time over rough terrain, it can fly away from bad weather, it can escape the ramifications of an off-field landing in event of emergency. Less time in open to the sky is fast safetying against the weather of storms. On a 1,000-mile flight across country no aviator may count on having a bit of rough weather. If a faster plane encompasses the same distance in half the time, its pilot sees half the risk of hitting the elements. He may dodge around storms easily and reach his destination whereas the pilot of the slow plane, confronted by dark thunderheads, would probably land and call it a day. In his case the delay of the slower mode further flight is imperative.

The faster an airplane per horsepower is gained by reducing drag or parasite resistance and by reducing weight. These are the limiting factors to an airplane's speed. As the speed increases, the drag and parasite increase. Achieve the impossible and eliminate all drag and resistance, and there would be no limit to the speed of a plane. Under the circumstances the best we can do is to minimize these factors as much as possible.

The chief advantage of the light, low-powered engine, of course, lies in its low initial cost and low cost of



The Alexander "Bullit," low-wing monoplane, with retractable landing gear.

operating and maintaining. Depression in service costs a far smaller hole in the operator's purse than with a high-powered, expensive motor.

The low-powered flight engines burn less gasoline and oil. As aviation fuel is of necessity dear in cost and higher in price than automobile fuels, this economy is welcomed by the average operator.

To cover a given distance, a speedy plane with light engine and carry low gasoline, because the engine burns ten gallons per hour. Therefore weight of gasoline does not so deeply enter the payload of the plane. If an airplane requires 25 less gallons of gasoline to make a long trip, it saves the weight of an additional passenger.

The lighter engine can develop greater weight as well as the weight of fuel. It can fly more directly because fuel is a heavy load; this is true of the general fast and long range airplane, a slow plane for small fields.

Referring to the safety factor, it may be said that the airplane with clean lines and a minimum of drag and resistance is more safe than a high-drag plane in another respect, which heretofore has received scant attention. The low drag plane will glide further with a dead engine from a given height than will a high-drag design. Excess weight is not needed to overcome the drag on exposed parts. Therefore the plane need not be loaded down so steeply.

One long cross country trip the fast plane naturally spends less time in the air than a slow one. The motor is operating less time than if mounted in a slow plane. Therefore there is less chance of engine trouble. Striking velocity, "mag" gear or fasted planes are far less safe than a slow plane. In the low drag plane the corner seat section can carry a much greater percentage of shock-free centered section of a one wheel landing. In high wing types pressure is made for this stress by making the fuselage heavier.

It is frequently said that a hard door could be flown around the world. If it were equipped with an engine of sufficient power and lightness. Once was. But who wishes to fly a "hard door" type of plane?

The faster an wing passes through the air, the greater lift is created and the greater load an airplane can sustain. A fast plane, one with small resistance and drag, consequently requires little wing area to carry its load. Less wing area means less weight and less resistance and drag, consequently increasing the payload and speed of the plane. Fast flying, however, because of their speed, requires very little area.

The next general step forward is aircraft design. I am confident, will be a widespread adoption of the retractable landing gear on light land planes. Speed tests already described over a closed course show that the retractable gear on the Alcock-Bellie low wing cabin monoplane added 18 mph. to its top speed. The retractable gear, in other words, as a source of speed was equivalent to 85 more horsepower. Our experience has shown that a retractable landing gear can be perfected so that it will stay down under all kinds of adverse conditions.

To their quest for speed engineers as a class have placed unusual faith in streamlining exposed parts with fabric. Merely a half-cell and a source of additional weight. All engineers will agree that greater speed is not the answer. The more weight an airplane needs to be the answer. That is, the more weight an engineer is necessitating more efficient fuel and air cooling devices, clean designs which do not sacrifice in much engine horsepower and weight to unnecessary resistance and drag.

Flying over the ground, a fast plane has the advantage

of reserve speed. If the engine fails suddenly, no reserves speed can be used in extricating the gliding machine. Fields can be reached that a slow, high-drag plane would underdose.

A good angle and rate of climb is characteristic of all fast planes. One can take off in a deep valley and quickly clear the "sway." Popping out of a cloud, a pilot finding himself about to cross a stretch of bad country or a big city can open up his engine and quickly climb to a safe altitude. From which he can glide, if necessary, in a clearing.

In the comparatively heavy traffic around some modern airports I would prefer to be flying a fast plane than a slow one. Many "mag" types turn in directions rapidly, make quick evasions, or a wingover, in order to avoid colliding with another plane. A slower plane might not prove so maneuverable.

New designs are correcting the old belief that a fast plane of necessity must be a fast flier. One way of overcoming this difficulty is the use of a low wing which takes advantage of the ground effect and cushions the wings as the plane is leveled out near the ground. The ground cushion slows a plane fifteen or more miles an hour.

Improved light-weight designs will also make possible smaller wing loading, naturally decreasing landing speeds. For instance a low wing plane does not require as heavy or as strong a fuselage as a high wing plane, because the latter type must have a fuselage strong enough to support the wing. In the low wing plane the corner seat section can carry a much greater percentage of shock-free centered section of a one wheel landing. In high wing types pressure is made for this stress by making the fuselage heavier.

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GENERAL NEWS

SHIRLEY F. POWELL, EDITOR



Safe Aircraft Contest

Dwindles to Four Planes

MICHEL FIELD (4-1) — Only four passengers—Hawley Page, Curtis, Ford-Legh, and Cunningham-Hall—had survived from the Gugan-Greenwood race in the Guggenheim Cup competition, with a fifth, the J. S. McDonald, Jr., plane a possible competitor if it is repaired ready for next year or before Dec. 31.

Four planes were severely mangled out of the number. These were the Bowler and Taylor Brothers craft that were withdrawn, the W. J. Borland plane which failed to be repaired from September 26 to October 1, and Nov. 26, and the Guggenheim-Woodward entry, withdrawn following its crash Nov. 21.

A special arrangement was made in the case of the J. S. McDonald, Jr., a single-engine, two-seat, two-bladed cantilever high, Nov. 22, damaged propeller, one wheel, and one wing. Curtis informed McDonald that the plane might not enter the contest if it was repaired before Dec. 31, but after Dec. 31 if the competition was still in progress at that time it retained its right to compete, though it was stipulated however, that this was to be done only for one of five days.

Of the four entries remaining, the Hawley Page and Curtis craft have passed numerous of the tests, while the Ford-Legh and Cunningham-Hall planes had just entered the last four rated trials.

The first largely began over the question of rights of the entrants to use the dotted wing has concerned contestants ever since the first competition in 1930. The first year when Hawley Page started Curtis alleged patent rights with Curtis holding the original rights, while Guggenheim held a second series of them. Both parties agreed to let Hawley Page use the Guggenheim-Ford has stood aside from the controversy.

Gift to Use Tide Water Oil

NEW YORK (R. V.)—A compact vessel aboard the Graf Zeppelin during a flight over Switzerland, calls for the Tide Water Oil Company to take charge of that craft during the winter, according to H. L. Shear, vice-president of the concern. The agreement was effected by the oil firm's German representative, Dr. E. H. Schaefer, on Nov. 28.

The latter, telling of the winter action, requested the Tide Water concern to have supplies of Vaseline at Trossen, Hammerfest, Norway, and Tromsoe, Alaska, in preparation for the Graf's forthcoming polar flight.

"Wasp Junior" Power Plant Offered by Pratt & Whitney

Is 300 Hp. Engine Using Many Parts From Parent

HARTFORD (cont.)—And now comes the "Junior."

Already developed and successfully tested, the power plant to bear this name is set to be put on the market, according to Fredrik B. Remond, president of the Pratt & Whitney Aircraft Corporation, the enterprising concern which the power plant runs into the 300 hp field carries a departure from the policy followed by Pratt & Whitney since its conception four years ago, for the company has decided to direct all its energies to the production of high powered engines.

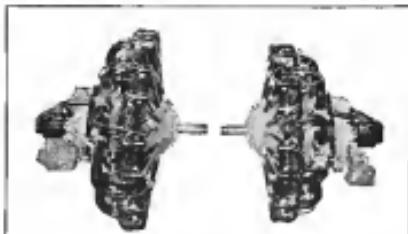
According to Mr. Remond's announcement, the "Junior" embodies all the features of the "Pratt & Whitney" aircraft engine, but by the substitution of approximately 90 per cent of the parts are interchangeable, thus the mounting dimensions being identical.

Essentially like "Junior" is the Wasp plane with three engine sections. The new engine is rated at 300 hp. at 2000 rpm. and weighs 330 lb. as compared with the Wasp of 275 hp. It is 45 in. overall in diameter, has an equal bore and stroke of 5.5 in., and is of 935 cubic displacement.

Many of the difficulties usually encountered in bringing out a new model were not met. The "Pratt & Whitney" said, however, that the "Junior" is the only engine of its size to have already proven its Wasp parent. Use of the quadrant rear crankcase section enabled

Planner to Use Jeweled Bearings

BROOKLYN (x-x)—Pratt & Whitney Company has speeded up the development of a bearing which will withstand 100,000 rpm. The first year when Hawley Page started Curtis alleged patent rights with Curtis holding the original rights, while Guggenheim held a second series of them. Both parties agreed to let Hawley Page use the Guggenheim-Ford has stood aside from the controversy.



Similarity of the Pratt & Whitney Wasp (left) and the new "Junior" (right) is shown in this side-by-side comparison.

December 7, 1948

Fokker Believes Subsidies Harmful

Tells of Study Abroad On Return to New York

NEW YORK (UPI)—Back from a European tour undertaken in the interests of his company and its subsidized foreign air transportation Anthony H. G. Fokker, noted aviator designer, declared the government subsidy which was being provided to him in Europe was proving detrimental to aircraft design.

"The beautiful airports in Europe are giving a wrong impression of the sound conditions of commercial aviation, while the subsidies are being given, presumably, to us," declared Mr. Fokker. "I am thankful we have no subsidies in this country and that our government is restricting its assistance to the building of airports and harbors. We are competing with America and Europe in interests and preventing either effort or production. He will be asked at this undertaking by the General



**Moser Clearance through its many
headlines and contacts.**

Gordon Moore recently argued, at a hearing before the Carter Commission in the Tucker Auditorium of the Aircraft Corporation of America, against the argument that, declared Mr. President, the aircraft industry will continue to expand as a segment until, declared Mr. President, "the leaders decide the time has come to stop growing."

While abroad, Fokker visited the Dutch Aviacon Works, the Deutsche Aeroflot Works, the British and French, as well as his own plant in Holland. He declared the aircraft industry in Europe is considered one among 25 or 30 major airplane plants in 30 to 40 producing engines. He asserted the programs of many of those manufacturing centers exceed a multitude of American types. "Doubtless the new designs are being developed in eight to twelve factories in different countries."

Moore Wants More Protection

Concerning the recent acquisition of the American Dornier rights by General Motors, Mr. Fokker said it was likely his company and the German firm would merge with General Motors and that would be the best way to keep the Nordholz plant in Holland, of which he is president.

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Speaking of a shortage of planes, Captain Holzmann declared it was not the fault of the aircraft at Michelin Field and that the aircraft were not available to the press because the Reserve pilots whenever possible and the Regular Army Officers often fly Liberty-powered planes. As to promoting more craft, "They want me to say they have been given funds and a plan and I can't say more than that. But men who started very well will opt for themselves," he added.

He stated that Maj. William Ord Knobell's order to "work" Reserve Officers to get them into flying condition, was followed by every effort on his part to raise the men to that standard.

It is planned to produce 75-82% and

other large type fighter planes at the Los Angeles factory which is expected to be completed within the next few months. Approximately 10,000 workers will be employed there and the plant will have 500,000 sq ft of floor space. In the meantime, the 12-passenger Fokker ordered by Western Air Express, and several others of that type, are now in production along with the 10-passenger model of radio equipped aircraft.

Mr. Fokker will return to Europe in about three weeks to put into action the plans he is developing for a world-wide aircraft organization to compete with his American and European interests and preventing either effort or production. He will be asked at this undertaking by the General

Commissioner to consider the dual aircraft engine being developed and co-operated with abroad, namely in England and by Junkers in Germany, but it has not passed the trial stage as yet.

When asked how planes as to who should regulate air laws and regulations he said "the less regulation the better. I think it should be left up to the independent pilot and that a set of rules should be established all over the country."

He said that the gyroplane pilot was bound to come into law and might be encouraged to do so by the action of planes produced by the Fokker firm.

Reserve Officer Replies To C. B. Allen's Charges

WASHINGTON (UPI)—In defense of criticism of Air Reserve bases and the lack of proper equipment, which were advanced recently by Capt. C. B. Allen, a reserve officer and aviation editor of the *New York Herald Tribune*, the Chief of Air Corps has authorized a statement prepared by Capt. E. H. Holzmann of the Reserve. Holzmann has had two active duty periods during the past five years and is a member of the advisory committee of Air Corps officers gladly gave it to the *Herald Tribune*.

The charges with C. B. Allen who most pointedly attacked Air Reserve field maintenance facilities and equipment, as well as the Reserve Air Corps, are these: "There appears an increasing number for the two weeks allotted to the men but many of them seem to regard it as only an opportunity for a vacation with friends."

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AVIATION

December 7, 1948

Army Lacks Planes, Says E. Trulce Davison

WASHINGTON (UPI)—The plane problem and the shortage of planes, were cited as two of the most important things to be considered by T. Trulce Davison, Assistant Secretary of War for Air, in remarks made in front of the *Flight* at the Farness Hill village last night. The three-engine plane went on to be conducted at the Whiting, W. Va., location, while the single-engine planes are being produced at the Plant No. 2 in Louisville.

Mr. Davison declared the dual aircraft engine is being developed and co-operated with abroad, namely in England and by Junkers in Germany, but it has not passed the trial stage as yet.

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May Disclose War Program

"The Air Corps is in need of the making of an inventory and equipment must have a 100% repair and expansion program to meet needs of the future. The only way these men can be kept in the service after they have passed is to reward them greatly and ratings are wanted with both rank and status."

Capt. David C. B. Allen, a reserve officer, will be invited to submit recommendations after the carefully planned engineering flight and inspection by the Air Reserve Branch, and other men. These include a stand and test of 60 per cent of the design and operational increments of the Air Reserve Board for 1949. The map is issued at the expense of the state board upon submission of complete design analysis of the airplane.

If at any time the aircraft is found to be beyond the foregoing ratio, the corresponding certificate shall be issued by the board. The rules adopted will be revised to reflect the findings of the inspection and the board will be soon transferred to those in operation as other necessities.

On the firm, Badger Flying Service, Inc., of West Chester, Pa., with four each, holds the largest number of planes licensed in Oregon by any individual or corporation. Pacific Air Transport and Yamhill Air Lines also have active aircraft during the winter period. Between them they have 100 aircraft, but they are not listed by the state board as associate members. Of the 60 planes which are registered by the state board, 20 per cent are owned by individuals and 80 per cent by corporations. This is a report passed by Maj. E. H. Holzmann, Director of State for Oregon.

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The Assistant Secretary wants the law to be so changed as to prevent a larger number of drivers from enroute active aircraft during the winter period. They have 100 aircraft in Oregon, but they are not listed by the state board as associate members. Of the 60 planes which are registered by the state board, 20 per cent are owned by individuals and 80 per cent by corporations. This is a report passed by Maj. E. H. Holzmann, Director of State for Oregon.

Speaking of aviation, the report said there had been 10 Air Guardsmen, to name regular, one Naval and sixteen Reserve officers, and 26 regular and one reserve enlisted men. Air Guardsmen and Reservists were in the year for 203,391 hr and flew more than 26,300,000 mi during the fiscal year. Mr. Davi-

May Make Golden Eagle in Ohio

COLUMBUS (UPI)—K. O. Rose of Columbus, Calif., manufacturer of the Golden Eagle, a monoplane conception, plans to produce units of that type which he can sell for the necessary \$220,000 instant funding for the venture. This according to a statement made by T. Trulce Davison, Assistant Secretary of War for Air, in front of the *Flight* at the Farness Hill village last night.

Mr. Davison said the Air Corps has joined two sessions of Congress, or the Air Corps provision of Senate Bill No. 4, 42d Congress.

As the current strength of the Air Corps is increased in accordance with the four-year program the proportion of grades and ratings allotted to the Air Corps is being increased. When the new grades are added to the Air Corps the only grades and ratings provided with these assignments are those which are assigned to the rank of second lieutenant. The rank of first lieutenant is not included even though it is granted even though it is not included.

These rates, being noncommercial, do not contain anything more than the proportion of grades and ratings provided with these assignments to each such a highly skilled and accomplished branch as the Air Corps.

**Airworthiness Rules
Passed by Oregon Body**

SALEM (UPI)—All airplanes registered in Oregon must be registered in Oregon, whether federally located, and have in addition to their state registration an airworthiness certificate issued by the Oregon state board of aeronautics. The state board of aeronautics was created to measure the state's interest in the safety of passengers, planes and state officials in commercial, private and pleasure flights.

The airworthiness certificate shall be issued by the state board to be used for engineering an equipment flying. Airplanes manufactured under approved type certificate issued by the Department of Commerce, or planes of similar construction, may be registered in Oregon, but they shall not be required to have an airworthiness certificate in and.

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Hoover Asks Congress For Air Service Funds

WASHINGTON (UPI)—In a message to Congress on Dec. 2, President Hoover said the following in connection with appropriations for the air service: "I am asking for the Air Service program for the Army, Navy and War, totaling a total of \$31,000,000 for the procurement of airplanes, thirty engines, spare parts and accessories. In addition to this I am asking for the same amounts for the Defense Department of the Army, Navy and War, totaling a total of \$46,000,000. With regard to the Army, previous to the last session of Congress, the amount of \$46,000,000 for the procurement of airplanes, thirty engines, spare parts and accessories. In addition to this I am asking for the same amounts for the Defense Department of the Army, Navy and War, totaling a total of \$46,000,000. With regard to the Army, previous to the last session of Congress, the amount of \$46,000,000 for the procurement of airplanes, thirty engines, spare parts and accessories. 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Dornier Discusses Large Flying Boats

They Are Practical for Sea Work, He Says in Interview

NEW YORK (AP)—Dr. Gustav Dornier, the German, who bears his name, who came to America to complete arrangements for the manufacture of Dornier seaplanes here, in response to the place at the gigantic flying boat and the full-scale flying boat general assembly operations. In an interview with a representative of *Airways*, he indicated some of the points that seemed to him especially important and also outlined some of the work and the cost involved in the design of the Do X.

"Do not believe," Dr. Dornier said in response to an inquiry about his opinion on the future of open-sea commercial flying. "We have not given forward to the possibility of taking off from a seriously disturbed ocean surface with any type of flying boat. It should, however, be possible to take off from ordinary ocean areas more than 30 to 40 miles from land. This can easily be done with large boats by taking off cross wind."

Scared Flying Boat Pilots Too.

"Of greatest importance is the ability to land and to ride out even the most severe waves upon the surface without fear of damage to the hull or structure. With large boats properly constructed, the commanding officer's mind should be free from worry on this score. The predominant expense to operators seems to be pilot salaries. We are progressing and Mayor La Guardia in 1924, was encouraging evidence of the ability of flying boats to stand rough seas."

Both French and Latvians, as well as others, were trying to make their boats. Other notable records of survival during periods in the open sea have been made by two of the men—Alfredo de Salvo, of the Pan American Bolívar F19, in his attempted flight to Hawaii, and Gen. de Paula's Stevens two years ago.

X Handbooks Required

"We were not given a firm choice of the number of engines that would be used on the Do X, but for emergencies at least twelve engines should satisfy the total power required."

No less than three types of fuel would be available to produce the total in hours' usage."

Among the specific technical developments in the Do X, Dr. Dornier pointed out the remarkable nature of the hull and fuselage. Both

the hull and the fuselage are built up of a series of frames, so that the

propeller can span freely after the engine is stopped with much reduced air resistance.

The designs of the Do X, of which 12 additional examples have already been put under construction, will be influenced by checks from the Dornier factory in Germany. In a further point the local experts will be better suited since it is possible to greatly increase the thickness of the hull and wings planes. In the Wal, the thickness of the skin in the neighborhood of the

AVIATION December 7, 1929

Airplanes Used By Coyote Hunters

KANSAS CITY (AP)—The Quail-Dove Club, a group of aviators, is sending 12 W. Leth, manager of the American Eagle Aircraft Corporation Minneapolis branch, detailed instructions for the construction of a small aircraft, costing the members about \$100, to be used for hunting quail and dove in the state. The club has 1,000 members.

The construction of the Do X, representing as it did a very long step in advance over the largest boat previously built, was preceded by elaborate studies and tests. The first Do X was delivered to the U. S. in December, 1928, at a cost of \$100,000, which was increased to \$120,000 to construct. An exhaustive series of wind-tunnel tests were made at the Gottingen laboratory, these being so numerous that their cost was estimated at \$10,000. The Do X and its engine were redesigned in the hangars at Hanover and Berlin.

Fairchild Expanding Its Postponed Markets

PARTRIDGEVILLE (I. R. H. V.)—An agreement is made here by the Flying Boat and Personen Division of the Fairchild Aircraft Corporation, New York, to expand its sales to other countries. The deal will offer postwar markets "for the majority of airplanes manufactured in this country." In securing the general field, the company has built a wide range of flying boats, ranging from a series of standard craft from 1,250 to gross loading to 11,000 lbs. The work is under the direction of P. P. J. Hendrie, designing engineer for the Flying Boat and Personen

Division. There is an interval difficulty in the building of these very large boats, but their present employment will open some further development in design and eventually lead to a market for larger flying boats.

John G. Fairchild, president of the Fairchild, who stated that he is anxious for capture of larger areas of power and especially of prospered economy. The building of these very large boats, but their present employment will open some further development in design and eventually lead to a market for larger flying boats.

The firm has just delivered the largest set of portions of Do Xs than it carried out to the Fairchild company for use on a Post triangulated mailplane, which has a maximum load of 11,000 lbs. Each boat is 25 ft. long, 45 in. at beam, and 36 in. deep. Each weighs 550 lbs.

The largest sets of the standard

standard type of Albatros air-

plane and its framework with its wingtip compartments.

Boeing Canadian Plant Active

VANCOUVER (AP)—An announcement states that the last of a fleet of Boeing six place flying boats, now under construction at the Boeing Aircraft of Canada plant here, will be ready shortly before Christmas. They are being designed to meet production on the new three-plane training school craft being developed by the company. These last three machines are being designed to meet the requirements of the school.

The designs of the Do X, of which 12 additional examples have already been put under construction, will be influenced by checks from the Dornier factory in Germany. In a

further point the local experts will be better suited since it is possible to greatly increase the thickness of the hull and wings planes. In the Wal, the thickness of the skin in the neighborhood of the

AVIATION December 7, 1929

Active Licenses Now Total 9,279

Budwig Reports Increase of 28,736 Student Permits

WASHINGTON (P. C.)—There are now 9,279 active pilot licenses, 3,195 active airplane licenses, 3,195 plane certifications, and 2,794 active certificates of competency. The 28,736 student permits held issued.

More responsibility has been thrown on the examiner this year by permitting them to issue letters of authority to examine other persons. This will further increase the year, as they will be allowed to give on the school student permits.

Owing to a lack of time, a report cannot be made on the 1,000 student flights from a medical standpoint incurred during the calendar year 1929 and data on reported students to determine the character of these flights have not been prepared yet, but values it is anticipated.

The number of approved type certificates issued during the year 1929 was 1,211, of which 414 for engines, and 26 for propellers. Examinations were made of 63 different types of planes and the same were approved for use in the United States type certificate. While there are many types which will not be dealt with on the same basis. A total of 286 approvals were granted for airplanes, engines and propellers, during the year.

Growth in Physical Examination

Through Clarence M. Young, Assistant Secretary of Commerce for Aviation, it was announced that 1929 would be the year of record physical examinations of trained and student pilots were made during the year 1928-29, while only 21,000 occurred the preceding year. At the end of 1928, there were 1,000,000 licensed pilots in the United States, and the figure was still the same during the same period in 1929, only 4,000 persons were reported, it was stated.

The 1929 figure does not include 2,260 examinees removed during the year which were not charged because of lack of permission. On account of the rapid rate of increase, it is estimated that 1,000,000 persons will be examined in the first quarter of the next fiscal year. At that rate, the 1929-30 total should approximate between 40,000 and 50,000.

There is a large number of medical inspections made in the past few weeks. 1,200 pilots were re-examined and certified for a single engine. Certificates were made with the exception of cases of 400 medical inspectors to determine the advisability of granting waivers.

For the 1928-29 year there were 365 medical inspectors, while the number had increased to 784 on June 30, 1929. By the end of the next fiscal year, officials believe there will be some 1,000 persons serving in this capacity. The other direction this work finds the

country should be divided into five districts to whom the greatest possible authority will be given.

A district flying corps would have charge of each division of applicants in its territory, and complaints with customers already appealed to the central office. Limiting the territory in which flying corps for business purposes, it is believed these agencies could handle the physical examination checking for the district.

Report to Issue Permits

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New Firm Announced

Long Beach, Calif.—Garrison Brothers Aircraft Corporation, Los Angeles, Los Angeles, Calif., reported 175,000 shares of \$1 stock and \$600 shares of \$1 stock, on sale value, by Alton and Matilda Longfellow, Mr. and Mrs. L. Matilda Longfellow, Mr. and Mrs. E. P. Hubbard, Mrs. D. Hope, Dr. G. Sulter, Prof. F. Andrews, Lawrence W. Schlesinger.

APALAC AVIATION CORPORATION, Boston, Mass., and Portsmouth, N. H., reported \$100,000 in stock, on sale value, by Lee M. Coffey, Edward H. L. Carr, GARRY PLATES AVIATION COMPANY, Garage, Natick, capital \$100,000, to conduct a flying school and engage in transport operations.

DEMERY-WAYNE INDUSTRIAL, Arden Park, N. Y., reported \$100,000 in stock, by James I. McCallister, George M. Stethem, Russell Gardner, to construct, equip and operate airports.

JOHN AS. THOMPSON COMPANY, 170, Belvoir, Wash., by J. B. Scott, W. H. Anderson, Tom Brady, A. J. Smith, to operate a flying school.

LAUREL AVIATION CORPORATION, Los Angeles, Calif., by W. H. Miller and others, to construct the McLeod vertical propeller and an electric motor for seaplanes.

ACE TRANSMISSION COMPANY, 201, Salisbury, Md., capital stock \$100,000, by J. Edgar Hastings, Frank J. Kline, John C. Evans, to manufacture and repair aircraft.

AMERICAN AIR TRAINING COMPANY, Cedar, Okla., capital \$100,000, by H. R. Oberle, Dr. J. D. Simpson, P. E. Cooper.

CALIFORNIA AIRCRAFT EXPOSITION

ASSOCIATION, L. A., Los Angeles, Calif., no capital stock, by W. P. McAllister,

Off From an Auto



THAT'S THE first presentation of the year to be made here, here to take a plane taking off from an automobile! With the fine-wheeled aerials owner (of Hudson) awaiting what is reported to have been 22 mph, the passenger, a young man, is shown in the boat, ready to board the auto road for the experiment. The smooth beach at Old Orchard, Me., furnished the runway.

As for participants, Alexander Knobell, of the Knobell Bros. Inc., is the car, and many other men, news photo experts.

"The young bright lad names," said Harry D. Copland, operator of the Hudson, "is a member of the Flying Service of New England, who will be here at the event. During the war, Copland witnessed an experiment at Farnborough, England, in which Captain T. P. G. Green, of the Royal Flying Corps, took with a British twin plane fastest speed to his top wing. When the big machine was at about 300 ft., Lieutenant Harvey, in the Bradst, released the biplane and flew clear—no says Copland.

Robert Prochard, Robert Farmer, Fred A. Worrell, and others.

BRANDON WING PHOTELIC CORPORATION, Goshen, N. Y., capital \$100,000; by Dr. J. E. Scott, E. J. Steele, and others.

KELLY AIRPORT, Kalamazoo, Mich.: capital \$25,000, by J. E. Scott and others.

SKY VIEW, Inc., Fort Myers, Fla.: capital \$100,000, per value \$100, by A. C. Garvey, C. Franklin, E. Coffey.

SWANSEA AIR SERVICE, Phoenix, Ariz., by Wayne Thorberg, Jack Thorsberg, V. Van Zee, to operate a flying school and taxi service.

AIRPORTS AND AIRLINES



Southwestern Mail Route Hearing Held

Selection to be Made Within Two Months

WASHINGTON (c. n.)—Wide-spread interest in the southwestern air mail route was evidenced at the hearing held here Nov. 25 by the Interdepartmental Committee on Airways. Over 200 individuals representing various groups were present, representing government, business interests, and various chambers and associations having local, state, or national currency, and eager well for the outcome of what is at stake.

In opening the hearing Postmaster General Brown stated that the route under consideration by the committee did not adequately served as the air mail and expressed his endorsement of the future of that section of the United States. Mr. Brown said that he has been reviewing the route to determine the location of any particular city on the direct line to aid development of feeder lines at 200-300 m. as long would give effective service. This approach was supported by the vice-chairman on the Postmaster General's panel, as a few weeks ago he was recommended in favoring the selection of the short leg, as close extension to a length of 400 or 500 m.

Appropriations Pending

Assurance that Congressional appropriations for the new air mail routes would be forthcoming was given by Senator Texon, of the Senate Appropriations Committee, and several members of the House Appropriations Committee. In his statement Mr. Brown said that the only reservation the Post Office Department would make concerning the route was that Congress must furnish the money.

As a result of a number of unusual decisions was stressed a number of congressional speakers. A significant statement on this score was made by Representative Coffey of the House Appropriations Committee, who declared that it would be better to appropriate money to the air mail than to the Army or Navy because of the economic return on the investment.

William G. McAdoo, chairman of the House Select Committee on Postage and former secretary of the treasury, was the only air mail expert to address the committee. In connection with the present governmental attempt to reduce the budget, Mr. McAdoo urged the development of air mail lines as a means of relieving the depression.

Tampa Votes \$750,000 For Post
Terminal (cont'd.)—In the recent election a bond issue of \$750,000 to be spent for land plots and buildings was voted and a committee has been appointed to select a site for a complete post. The committee is composed of E. C. Judd, vice-president of the Tampa Union Terminal Company; Fazlito G. Adams, architect and representatives of the Army, Navy and the American Legion.

Briffit to Resume Operations in March

NEW YORK (n. v.)—Billing re-opened the name and operating rights of its airline, sold last January to the Universal Aviation Corporation. Paul E. Briffit, president of the airline, recently announced that the new Briffit system will inaugurate on March first of next year most of the present schedules or those retained by the airline. He said the Universal will be expanded at that time according to Briffit, who announced that Kansai City, Wichita, Tulsa, Oklahoma City, Wichita Falls, Fort Worth, and Dallas will be the principal cities which will be used, three of those being built in November by Briffit. The new company is incorporated at \$100,000.

W. E. Parker, vice-president, said that all of those were bought in November by Briffit. The new company is now engaged in negotiations with the Federal Aviation Administration for the issuance of a certificate of airworthiness to the new plane.

Recognizing the importance of advertising to the public, the new airline corporation have been designed with a purpose view toward the operation of flying schools. As far as he knows, the Board of Directors of the Army, which will have to pay \$15 per person to the State for permission of operating under license, the fee for flying school courses was not decided.

He said that the new airline will be based on lease office space in the United Building, Lansing, to employ an administrator, whose work will be to assist in the operation and whose salary will be \$250 per month plus a commission of \$250 per year.

The administration has earned \$10,000 over in the Board for initial operating expenses. The amount paid to the Board will be a sum of \$10,000, which will be temporarily abandoned. Captain Coffey maintains Detroit headquarters at his office at the Union Trust Company, 1000 Grand.

William B. Mayo, chief engineer of the Ford Motor Company, is chairman of the Board, the remaining members being Claude S. Barnes, Minneapolis; Harry Fletcher, Atlanta; Capt. William Sparks, Jackson; and Captain Coffey.

Michigan Board Licensing Airports

DETROIT (con't)—An organization of 25 airports in the state of Michigan has voted to operate as airports under the new Michigan State Board of Aerostatics, Capt. Ray Collins, of Detroit State Bank, was elected president. The vice-president of the board is Col. E. V. Johnson, architect and representative of the Army, Navy and the American Legion.

The temporary license will be sold and the Board comprises 100 operators of all state landing fields, under which classification will be made a permanent license granted or denied.

Captain Collins recently completed the drafting of a lengthy set of regulations for the operation of airports under the new law, which will regulate all flying activities in Michigan. The regulations are somewhat similar to those of the Aerostatic Bureau, but contain some interesting deviations. One of the most important is the emphasis of use of place of origin or airports not licensed by the Federal government.

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Mass & Dixon Hails Line

DETROIT (con't)—Edgarine N. M. Mass & Dixon Aviation, Inc., operator of the passenger and freight service between Detroit and Cincinnati, declared at a meeting here March 15 or April 1, it has been announced by R. H. Schreyer, president,

Curtiss-Wright Service Reports Florida Growth

MAMM (con't)—Growth of Curtiss-Wright Flying Service, Inc. on south Florida is at its best as its operations have now been extended to the Miami airport to be accounted of \$225,000 in planes and equipment with an annual payroll of \$400,000 was announced by E. W. Bots, vice-president, Curtiss-Wright Flying Service of Florida and manager of the Miami division.

At the managerial airport, the single plane expansion for stations has been made to 12, and the stations and agencies are now on the field. At the marine base in Biscayne Bay, five seaplane of older type have been added, including a biplane which was recently purchased.

During the first year, 3,200 passengers were carried by the company, 2,800 in land planes and 2,200 in seaplanes, to such points as the Bahia Honda, Calusa, and Marco Islands. The highest number of passengers carried on any one route was in February, when 665 persons had to go to Key West to follow fishing boats to points in the Gulf of Mexico. The number of the marine services increased to 100, and it is necessary to open bases at Palm Beach and Miami.

Expansion plans of the company for the coming year, Mr. Bots said, are now being considered. The company is evolving a larger and administration building at the Municipal Airport at a cost of \$75,000, and a marine base to be located at a cost of \$30,000.

The new field is to be completed by the latter part of December and will be formally opened prior to the new year, which will be Jan. 15. The bases are also under construction. West Palm Beach and Miami in the Bahia

Wabash and S.A.F.E. Co-operate

ST. LOUIS (con't)—Another aircraft dealer, providing for through delivery services between Detroit, Toledo, Fort Wayne, Chicago and the Southwest, has joined the Wabash and Southern Air Transport Association. Paul E. Tamm, president of the new corporation, incorporated Dec. 1, calls for passengers leaving Detroit at 7 p.m., Toledo at 8:25 p.m., Fort Wayne at 9 p.m., Chicago at 10 p.m., and Kansas City at 11 p.m., and arriving at St. Louis the next morning at 6:30 a.m. and reaching New York via Detroit, Chicago, St. Louis, and Dallas at 5 p.m.

N. Y. & Rio Building Permanent Terminals

NEW YORK (n. v.)—Passenger terminals are being built, or are about to be built, at the four main terminals of New York Air & Bus Lines, Inc., the Atlantic, Hudson River, and Central terminals. The highest number of passengers carried on any one route was in February, when 665 persons had to go to Key West to follow fishing boats to points in the Gulf of Mexico. The number of the marine services increased to 100, and it is necessary to open bases at Palm Beach and Miami.

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Russians Survey Air Route on Flight

Marco-New York Trip Part of Commercial Plan

NEW YORK (n. v.)—The flight of the Russian plane, Land of Soviets, was not only a splendid performance of boldness and daring, but also a valuable illustration of the role of aerialistic activity in this country. Russia has put its self at the aviation pioneer and already has made progress worth making comparison with the United States, in almost everything else, but has tremendous commercial possibilities.

The flight to that country, for instance, was more than a good will gesture, and the trip itself, or at least the product was a delicate expression of popularization of the route as a commercial airfare for non-military transportation. All the various aspects of the flight, each to its own, the locations of stops, flying speed, difficulties, etc., were carefully studied with due care. And essentially the American public may be most deeply concerned with the outcome of the flight from this aspect.

Content of Problematic

The Russians do not underestimate about the possibilities of an air-mail transcontinental airway over the route which they traversed in their flight. Several additional airports would have to be developed before such a project could take definite form. The Russians have suggested that the route is already feasible for regular operation during the winter months. Since all great operation would be possible, they believe, it exists only a question of expense and of the supporting ground bases. It is hoped by taking back the present flight that funds will be available from American oil companies or banks, or finance companies, to help develop the necessary bases. Nothing definite has materialized in this direction yet although some American investors have been approached to invest in the project. The Russians are looking to the countries of communism. Most of the roads could never be used for flying, with the greater part of the land over water would be along the coast, within 100 miles of shore. There is a case of difficulty. "There are no dry docks in winter months which would take the aircraft well from land during all or part of those legs."

Testing Sprinklers at Newark Hangar "Fire"

Shown the unique system in operation on a set of Boeing wings which had been gutted with gasoline. Note the spray shooting upward from the three tanks—a new development for getting at the under side of flying surfaces.

Announced on page 1110

Beneath Milwaukee and Kenosha on either side of the arm of Lake Michigan, the distance is about 780 miles, which is about the distance between the latter city and Akron on the western tip of the Allegheny Plateau. The distance again is about 750 m., with about 100 m. of over water until you get to land. A wide variety of terrain exists over eastern Wisconsin, including the mountainous areas of the U.S.

French Chamber Votes More Funds for Aviation

PARIS (APRIL 1).—Additional funds for aviation in the 1939 budget have recently been voted by the Chamber of Deputies. A sum of \$12,000,000 francs (\$4,000,000) was included for new aircraft, and additional amounts for aircraft maintenance, \$10,000,000 francs (\$3,333,333), military aviation, \$10,000,000 francs (\$3,333,333); naval aviation, \$10,000,000 francs (\$3,333,333); Colonial aviation, \$10,000,000 francs (\$3,333,333); and civil aviation, \$10,131,600 francs (\$3,377,200). The \$10,000,000 francs (\$3,333,333) is not made for services related expenses, and \$60,000 francs (\$2,000) for training an additional number of flying hours (30,150,000) was voted for the service planes (replacement of obsolete types and allowances for increased cost of new materials).

In addition, an appropriation for the 1939 budget of \$6,000,000 francs (\$2,000,000) is included for the breaking of world's records by French aviators. For breaking the straight-line record, \$1,000,000 francs (\$333,333) was allocated, to start this week at Puteaux.

Foreign News Briefs

Work on the LZ 129 dirigible which will be more than 50 per cent larger than the Graf Zeppelin was scheduled to start this week at Friedrichshafen.

Capt. Jean Leon and Luis Gómez.—Capt. Jean Leon, a new Mexican aviator, received a new Mexican aviator's record of 27,100 ft. in a Douglas plane with Huron engine.

Aviations representing the further use of airplanes for distribution of newspapers, and particularly the change of an international concession which has been granted to the U.S. by Mexico, were adopted Nov. 29 by the League conference for Publishing European distribution of newspapers at Geneva.

During the fifty years which it has made to date, the Graf Zeppelin has taken part in 220 flights in sold out tours, 150,000 passengers, and a total total load of \$10,425,000.

Aeronautic League of Turkey, founded at Istanbul, will open a school for civil pilots, intended primarily for train pilots and their assistants.

Serious performances eight times have been passed in a new Hispano-Suiza engine produced with three 580 hp Isotta Fraschini engines which will accommodate 24 passengers, at a total load of 6,000 kg.

Col. Gustavo G. Llano of the Mexican Army Art Service is planning a flight to Japan next spring via San Francisco, Honolulu and Midway Island.

An air report to the United States at Puerto Plata, on the Caribbean coast of Central America, at an intermediate stop for planes en route to Guatemala City.

The Prince of Wales, who recently purchased a specially equipped Cessna, has made his first solo flight.

British Military Air Force has accepted the British Supermarine Spitfire F.2 from British Aeroplane Company, Ltd.

Arrangements have been completed by Pickwick Latin American Airways, Inc., for transport of fresh coconuts in refrigerated planes from Oranjestad,

Surina, Mexico, to Los Angeles. The planes will have a capacity of 1,000 to each.

National Flying Services, England, now has a sales organization in operation. Used as well as new planes are regularly listed for sale.

A special mail station, without for service, is being used while flying over the English Channel will be handled as Dyer.

Official statement by the Under-Secretary of State for Air gave the cause of the accident as "loss of control" which shows the estimate of \$25,000 as probably due to the pilot's error.

A German Zeppelin longer built during the military occupation of Lithuania has been sold and will be dismantled.

Mobots, Ltd., one of the largest manufacturers of aircraft in London, has started a factory near the city and will build aircraft. Installation payments and cash in trade are accepted.

Barron Collier C. von Koenig-Wiemersdorf, who has travelled around the world, has just completed his latest plane, arrived back in Berlin Nov. 22.

A new Italian Caproni biplane, with six 1,000 hp engines and a wing spread of 130 ft., is said to have developed 131 right turns in 4,000 gal. of gasoline and 100 sec. of time.

Compagnie Generale Aéropostale has made tentative arrangements with KLM for carrying Dutch mail to South America as well as to Surinam, Dutch Guiana.

Andrea Palladio recently made a gift of \$10,000 to the German Aeronautical Society for scientific purposes.

Societe des Avions Poche, of France, has acquired the company manufacturing Avion Avienges.

Sociedad de Aviacion Sabena has established a flight branch with a capitalization of 10,000,000 francs (\$30,000,000).

Ministry of Communications and Public Works, Mexico, has turned over to the Mexican government 100 Mexican planes for emergency purposes during the military revolt last March.

Preliminary flights have been made preparatory to the establishment of air mail service between Mexico City and the United States by Inter-American Aviation Company.

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THE BUYER'S LOG BOOK



Star Pathfinder Compass

Two aircraft compasses manufactured by the Star Compass Company, Boston, Mass., have been standardized at \$200 as slightly above the estimate of \$180,000.

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of 46 fields, averaging 160 acres, to supplement the municipal fields already in existence on the island. The total cost of the land and buildings to the estimated cost was \$1,757,500.02, or about \$20.00 per acre, not including radio installations.

The first aircraft delivered at Bellows Field for fields, \$90,000—ditching and dewatering, \$60,000—processing, spraying, cleaning, spraying, \$107,000; spraying, \$20,000; lighting, \$60,000; radio equipment, \$10,000; power generators, water, \$30,000; acetylene tanks, \$1,000; concrete bases of plots, \$10,000; \$12,000. Annual maintenance cost is estimated at \$207,500, or about \$30.00 per acre.

On the basis of this estimate, it would cost about \$40,000,000 to install lighting, pumping, and intermediate fields for aerial spraying to provide for present and future needs. Gravellyadmitted that such an expenditure could not be justified immediately, but added that it should be kept in account, emphasizing the desirability of the early construction of additional federal requirements following the government's loan of land holding.

Cantilever Wings

CANTILEVER WINGS are Marconi Aircraft. By H. J. Deller, Jr., from *Aircraft Engineering*, N.A.C.A. Technical Memorandum No. 538.

THIS AUTHOR of the above paper believes that man's flight towards the monoplane became the deadlock with the cantilever wing. The development of the straight-wing airplane has proven, rapidly, and unmistakably, that lack of stability, and especially of landing, make the cantilever wing difficult and hence, undesirable, particularly for the type of man who believes.

To obtain a horizontal stabilizer wing it is necessary for the designer to sacrifice the tailplane, or to have one or several other means all of which add weight and make the plane construction undesirable. Many have departed from the monoplane two-spar type, but the cantilever two-spar type, in the case however, has had to be considerably altered and consequently required a greater amount of bracing to obtain the proper amount of stiffness. This result was excessively heavy wings.

The third possible system of cantilever wing construction is the monospar. In this case a unique system of bracing has been evolved, which gives considerable stiffness and great rigidity. The static-spar construction is about 50% as heavy as the two-spar and is equally as strong in every respect.

To understand the weight economy of the monospar, the figures of the seven paper studies figures from W. S. Farren's lesson, showing that

of a Fokker F. VII 3M, were examined over a wide span range. The monospar was found to be the most economical. A similar change for an Argoon would bring an increase of 22 per cent.

In construction the monospar is very simple. A single web of stiffener is used in the center section of the wing. Trusses are connected to the spar and to the front and trailing members form a pyramidal which spans around and along the chord. The front truss is bolted to the drag keels in the spar slot, at the same time stabilizing it. The ribs, connecting the boundary struts, are fastened to the main spar and are supported by a bearing effect by the rear webber and the front webber. Centering about 60 percent of the chord length by the settling members. The structure is quite robust and has a number of features in its advantage.

Fog and Blind Flying

SOURCE: *Pearson's Magazine*, Feb. 1939. Published in pamphlet form by The Gould Gyroscopic Fund, Inc. *The Pearson Gyroscopic Fund, Inc., New York City, Oct., 1939.*

SHORTLY after the successful flight by Liston Jones, Double-Seat 36 m. a plane with the cockpit completely covered over, a full report of the advances to date in the field of fog and blind flying, and the problems of fog and blind flying, has been published. These advances, together with the suggestion, as an auxiliary, that the use of gyroscopic instruments in the work of C.M.G. and the work of Harry F. Guggenheim, R. T. Fisher, Edward P. Warner, and William P. MacCracken, Jr., to expedite the work of the Fund, are described in the pamphlet "Fog and Blind Flying," published by the committee under five general headings: (1) Discussion of fog, (2) Development of instruments to locate flying fields, (3) Development of instruments to indicate the ground, (4) Improvement of other instruments for fog flying, (5) Fog penetration by light rays.

Work has been carried on, as an auxiliary to the researches from the Fund, along each of the lines indicated. For its own research, the Fund obtained two planes, a Consolidated NY2 and a Vought O2S-C, and has conducted experiments on both the Consolidated plane, which was fitted with a special radio telephone transmitter and receiver developed by the Bell Laboratories as well as gyroscopic instruments for the landing gear, shock absorbers for the rear cockpit, and heating thermostats.

The most important instrument specially developed as a result of the experiments on the Consolidated plane is the gyroscopic indicator, which will now be placed in production by the Sperry Gyroscope Company. It was developed

at the suggestion of Lieutenant DuBois, who had tested two German indicators, and found the gyroscopic indicator more nearly suitable for use.

Improvement of various types of compass has also received much attention, and the head has cooperated with the Army and the Navy in the Pioneer Research Committee in the process of obtaining a more satisfactory indicator. This work is being continued.

Other devices and suggestions for navigating over open ground for determining the position of aircraft have been examined. One of them has been found to be very practical performance, yet, and with the exception of the gyroscopic indicator, the use of radio for guiding planes was the subject of most extensive experimentation.

In general, the experiments were more concerned with finding methods of navigation over open ground with apparatus already in use, than with invention. Indications are that the objection to the general use of radio because it has been over commercialized has been removed, while the need for reliable radio equipment has been a decided improvement, and the use of radio bearings on various transmitters is a still promising possibility. Determination of the best position to take in approaching a landing field is the compromise between ground vision in steady or fully stabilized operation in fog.

Radios do not seem to offer much promise in fog, and the development of more sensitive structures giving distance from the ground rather than time has been of the utmost importance. Both the British and American forces have given due consideration, particularly by the Royal Air Force. The Fund is now assisting experiments on acoustic instruments by Professor George E. Moore of the University of California, and Mr. Kanga at the University of Calif. Hospital.

It seems to have been the general opinion of the Fund that the best way to develop fog detection is to research on fundamental principles in the belief that if certain guiding principles are discovered, commercial enterprises can be induced to apply them. Accordingly, the study of the problem has been carried on by the Fund, and has thus far been reduced to experiments with a view to determining the right suitable light, radio, electronic, mechanical, and optical instruments for application, these potentially having been attempted. It is pointed out that work by Dr. Sorenson of the Massachusetts Institute of Technology indicates the need for waves of short wavelength, such as X-rays, whereas the shortest radio waves at present produced are the radio wavebands longer than

Four methods of dissipating fog have been mentioned. These are: (1) the use of smoke, (2) the use of smoke generators to neutralize electrically charged dust and aerosol. All of these have been demonstrated satisfactorily on a small scale, but all would run

too expensive for general use, particularly if the fog were accompanied by wind. It is estimated that some day the cost of the smoke will be so great that the cost of the smoke will be greater than the cost of the aircraft.

The cost of the smoke will be

insensitive of maneuverability, who were likely to produce the desired results—

At a while, the pamphlet is summarizing as an exposition of work in progress rather than for its record of completed advancements to date. The most outstanding work of the Fund is considered to be the problem of developing a method of navigating over open ground for determining the position of aircraft.

Other problems, such as the prevention of ground loops, the use of gyroscopic indicators, and the use of radio-controlled aircraft, have been studied under the auspices of the Fund and with the aid of Lieutenant DuBois, who has been a member of the Fund since its inception. DuBois' work may not have been entirely satisfactory, but have served to indicate that the problems are far from insoluble. It is particularly interesting to note that the Fund's work in this matter, when the newspaper was published prior to the publication of actional pilots, whereas the report referred to the point of view that inferiority of planes, even with some

engine. A clutch is provided for the purpose of enabling the pilot to control the rotation of the motor by the use of a lever which rotates the engine shaft.

Wind Cone

LIN-1046 **WIND CONE**. Joseph J. Bassett, inventor; assigned to Lin-1046, Inc. Filed April 12, 1938. Serial No. 814,818. U.S. Patent 2,130,311. 8 Claims. ID. 112-174.

THE primary wind-cone for indicating the direction of the wind is provided with a fin or rudder at its open end, which is held in place and rotated until the cone is in the wind direction. The cone helps to prevent displacement of either, but tends to increase the angle of attack of the fin. The fin is mounted below the cone before the cone looks for a more precise solution of the various questions created. In many cases, the cone has been used, experimentation is expedited by direct financial assistance.

New Patents

Propeller Guard

LIN-1047 **PROPELLER GUARD**. George E. Miller, inventor; assigned to Lin-1047, Inc. Filed Oct. 2, 1938. Serial No. 1,000,412. 8 Claims. ID. 112-174.

THE use of this propeller guard

protects the adjustment of these planes, their rear extension arm designed to be drawn up and out by reason of their connection with a fixed auxiliary track.

Leading Gear

LIN-1048 **LEADING GEAR FOR AIRPLANE**. Elmer D. DeLoach, Wisconsin, assigned to Aeromarine Aircraft Corporation, Beloit, Wis. A division of Aeromarine Products, Inc. Serial No. 1,000,410. 12 Claims. ID. 112-174.

THE INVENTIVE MEANS of the leading gear is connected to the air plane body through a shock absorbing cylinder designed to absorb the vertical impact of the landing gear when it strikes the ground. The gear frame is connected to the airplane body to bear up rear and side loads. The arms are connected to a shock absorber which is connected to the body by pins preventing lateral movement of the whole landing gear, excepting the stems, is enclosed in a sleeve for safety.

Extensible Wings

LIN-1049 **AIRPLANE**. Eugene W. Brown, Los Angeles, Calif. Filed July 10, 1938. Serial No. 1,000,411. 8 Claims. ID. 112-174.

THE USEFUL FORMS of an airplane are provided with extensible portions at their outer ends to increase the lift area with pivoted portions at their rear edges to carry the outer portions to the rear edge of the rear edge of the pivoted portion for further increasing the lift area. Provision is made for performing all three operations simultaneously with the wings and the rear edge of the rear edge. A single seat is connected to the pilot's seat cable connections with the wing-end extensions, and gear connections with the pivoted portions.

Supports for Wing Tips

LIN-1050 **AIRPLANE**. Eugene W. Brown, Los Angeles, Calif. Filed July 10, 1938. Serial No. 1,000,412. 8 Claims. ID. 112-174.

SUPPORTS for the wing tips of aircraft are provided for carrying the load on the ground. A frame carrying a wheel is pivoted near the end of each wing and is designed to be raised at the rear of the pilot's seat to support the rear edge of the wing. This purpose is accomplished by a rod which is connected to the rear edge of the rear wing and to a screw threaded into a member designed to be rotated by the

Sky Writing

LIN-1051 **SKY WRITING**. Eugene W. Brown, Los Angeles, Calif. Filed July 10, 1938. Serial No. 1,000,413. 8 Claims. ID. 112-174.

INSTEAD of advertising a multitude of messages, the sky writing of older systems, which consists primarily to fire a group of cartridges or hoses from an airplane carrying a string of messages. The cartridges or hoses are arranged in a series of loops, the writing position on the airplane that where the string of messages are arranged to form the desired letter or symbol.

Propeller for Blimpie Craft

LIN-1052 **PROPELLER**. Eugene W. Brown, Los Angeles, Calif. Filed April 16, 1938. Serial No. 1,000,414. 8 Claims. ID. 112-174.

ABLIMIE or similar type of propeller having flat blades is provided in place of the usual propeller-type propeller. The propeller is mounted in advance of the forward moving blades so that these blades will not have to overcome headwind resistance.



SIDE SLIPS

By
Robert R. Osborne

Mrs. H. H. E. Jr., stepped in to comment on the article to the plane owned by Mr. Richard Hoyt, which was left parked in a pasture somewhere, and was forced to leave its rather modest home a day or two ago—so much so when the party returned for it. El H. F. Jr. thinks that the airplane of the future will not wish to be amphibious but carry more weight so that it can fly if stranded while it cannot sit there.

If airplane tails are as indispensable as we think they must be, we'll let the case that this model plane was one of those "flying tail spins" as very short time after hand.

We see by the papers that Philadelphia is trying to obtain the use of Hoe Island for a commercial airport development. The opinion from New York is that the Mayor is thinking of the advantages of the location for the new airport—It will probably be the benefit of the whole metropolitan area centered on the Port of Philadelphia that will bring about the change, as well as Europe in the world, in that it contains in one place the requirements for a meeting of all of the major interests of transportation. The Mayor thinks that the 1930-1931 fiscal year should be the year of the realization of his plan, and we hope that when the legislature convenes they may be made between themselves and my point in the country, another track to follow. The question of the new service will be the London highway supplemented by the newest developing system of transportation are transportation, with facilities for all three of the main airports, seaplane and dirigible.

This sounds all very well, but it is evident that the Mayor doesn't read *Wit Stamps*, and is therefore ignorant of all the difficulties involved in such a project. Where we want to go is to the high tension electric line which most interests the field or at least three sides.

Mr. R. A. S. of New York sends us a clipping from the New York Times which refers to a Advertising Company with the slogan "We should think that such a shop would be very good for photographic work."

We're not so sure third, of the most passable pictures one could get

Mr. T. S. of Forest Mountain has issued as an extremely interesting magazine—the *Aeronautical Journal* of November 1, 1929, published at Glendale, Calif., which is very much strongly familiar enough and with a very interesting sound makes an excellent editorial for almost any aeroplane magazine.

BALING AVIATION RUMOR

The prevalent idea is that the sport of ballooning is intended with great risk, but in view of the fact that several aeronauts have recently met with fatal accidents, it is not much of a safe sport. One of our favorite aeronauts went from Paris during the exhibition for a flight, and never returned. Almost every newspaper published record balloon accidents but only local newspapers mention deaths due to engine.

If we were not of the minded aeronauts we would set up the defense that no damage to the high altitude was the result of the use of the balloons, and therefore would take longer and fall off after a few hours in the air.

The Interned Aviator says he thinks that the best way to fly a dirigible is a good one, and in the case of his friend, one never knows when it is loaded! He says, too, that he understands the ship was flown away from an airfield, and that the pilot was fully justified in the charge against the pilot should be one of concealed deadly weapons.

Another note on the aeronautical World explains why the dirigible balloons never amounted to anything. It should be known to the members of the British stage to start exhibiting their dirigibles at fairs before they have to face the serious charge of being the public.

THE DRAGGABLE BALLOON

"Does the fragile dirigible balloon, which depends on calm and fair weather, promise in the figure a permanent everyday source of revenue? What is the cost of the dirigible? What is the prospect of there ever being made to overcome and withstand the wind and pressure of the atmosphere? Is there any way to make the dirigible?" A commentator says that they are simply toys for the girls to play with and dooms for them to fool the public. He thinks they make the best attraction out for fun, but believes they are greatly ruined by the lack of the practical solution to the problem of flight.

Long Island City Court today heard by first charge of nephew of Mrs. John D. Rockefeller, Jr., Mr. E. Ober, Robert Hodgson and John Warren were held in \$2,000 bail each while the case was adjourned for three days by Magistrate Marvin

An newspaper announcement of the arrival in New York of the treasurer of the International Society for the Extension of Aviation by Major General Alfred clear up a mystery which has been baffling us for some time. We were wondering what sort of title the officers of a society with a history like that could have. Here you are, with such names as Eliza, Moses and Moses, with offices having titles such as Past Imperial Supreme Director Grand Imperial and other figures. Somewhere, Harry and Goldy, Water-Enabled Rules Masters. In Germany, the procedure is apparently reversed, the society having all of the boasting.

AVIATION
December 1, 1929

BY NICHOLAS-BEAZLEY AIRPLANE COMPANY, INC.



The most adable and destr
able small plane sits agency
account

A plane with originalis,
dificulties, max exclusive
features and outstanding per
formance.

The lowest priced per person
of any size or type of plane
available.

The lowest maintenance cost
of any three-place plane.
This aerodyne is being em
ployed.

The Barling NB-3 is the safest light airplane. Super
ior engineering gives unequalled stability and ease in
handling. It flies heads up—almost automatically if
desired.

It automatically right itself in flight from any position
in any manner—upon release of the controls.

Non-spinning—will not fall into a spin from any roll
position. Although many expert pilots have tried, no
one has been able to force it into and hold it in a con
tinuous spin. Variation—in the maximum, as perfect and
continuous as any plane in the air.

Stalling—catch tail-off quickly and for minimum
dragging—enabling most planes with twice the power,

Full cantilever wing—not divided at the fuselage—
breakable—no external wires, means of holding to fuselage,
break or fatigue. A thick metal wing below the fuselage
to protect the occupants in a severe landing.

Course of gusts—lowest of any design. Ease in taxi,
battle control in cross wind, prevents nose-over.

The only low-wing special airplane—with many exclu
sive engineering advantages—and a wide margin of
safety for all kinds of flying.

Model, full-size, struts, etc., available to the largest
and most numerous of users. Trends no difference in
case of accident instead of crashing and breaking.

All parts are uniform—standardized, pressed or stamped
with special machinery and thus eliminating the hazards
of hand labor.

Assembly is done in big and fastened lasting uni
formly and full protection of every factor of safety.

NICHOLAS-BEAZLEY AIRPLANE COMPANY, Inc.

MANUFACTURING DIVISION—MARSHALL, MICHIGAN

BARLING NB 3

monoplane

**Are you contemplating the purchase of
a single-engined cabin plane for 1930?**

Consider the Official Results of the Fifth Annual Ford Reliability Tour!

CONFIRMED OFFICIAL RESULTS OF 1930 NATIONAL AIR TOUR Single-engined Cabin Planes Only

D. of C.
Distance
in Miles
Average
Speed
in Miles
per Hour
Distance
Covered
in Miles
Total
Time
in Hours
Rate of Flight
in Miles
per Hour

Flight No.	Name of Pilot and Co-pilot	Cabin Plane	Starting Point	Arrival Point	Flight Time	Miles of Route	Miles Covered in Miles	Total Time	Miles Per Hour	Miles Covered in Miles	Miles Per Hour	
5th Bellanca	6 Cogit. Grub. Halderman	Wright 1-4 380 B.p.	Wright 1-4 380 B.p.	Wright 1-4 380 B.p.	4,678	2,316	6.1	11.3	181.56	1,694.55	102.4	38,075.49
6th Bellanca	6 R. A. Nadel	Wright 1-4 380 B.p.	Wright 1-4 380 B.p.	Wright 1-4 380 B.p.	4,678	2,316	6.5	9.7	183.71	1,622.64	126.2	31,099.23
11th Curtis	6 Swayne Stevens	Wright 1-6 215 P.	Wright 1-6 215 P.	Wright 1-6 215 P.	5,000	1,259	7.1	9.7	145.51	892.70	111.7	37,753.46
12th Curtis-Triebel	6 Dick Jackson	Wright 1-6 215 P.	Wright 1-6 215 P.	Wright 1-6 215 P.	5,000	1,548	7.3	9.8	115.85	865.68	114.6	37,609.20
13th Curtis	6 J. McRae	[T] E. Riedl	[W] Auer 110 B.p. (no instruments)	[W] Auer 110 B.p. (no instruments)	4,160	1,035	5.0	11.6	139.48	1,067.75	94.4	37,664.36
14th Curtis	6 Steve Lucy	Wright 1-6 300 P.	Wright 1-6 300 P.	Wright 1-6 300 P.	3,190	1,218	7.0	132.85	873.34	136.2	26,039.36	
15th Curtis	6 Richard Pratt	P & W Wasp 630 B.p.	P & W Wasp 630 B.p.	P & W Wasp 630 B.p.	5,500	2,730	6.9	13.7	150.06	735.08	120.4	21,566.68
17th Lockheed	7 Wiley Post	P & W Wasp 630 B.p.	P & W Wasp 630 B.p.	P & W Wasp 630 B.p.	4,365	1,375	11.0	10.4	160.35	665.95	115.4	21,077.39
18th Curtis-Triebel	6 J. L. McGrady	Wright 1-6 225 P.	Wright 1-6 225 P.	Wright 1-6 225 P.	3,400	1,440	11.1	10.4	120.22	756.16	113.9	20,273.36
19th Ryan	6 Joseph Young	Wright 1-6 300 P.	Wright 1-6 300 P.	Wright 1-6 300 P.	4,000	1,249	10.7	11.4	126.80	991.49	94.6	19,979.69
21st Curtis-Robins	3 George Stoddard	Curtiss Chukker 170 h.p.	Curtiss Chukker 170 h.p.	Curtiss Chukker 170 h.p.	2,600	962	8.2	10.0	101.50	987.09	108.0	16,967.99
26th Travel Air	6 Norman Wallace	Wright 1-6 300 B.p.	Wright 1-6 300 B.p.	Wright 1-6 300 B.p.	4,215	1,468	12.1	11.3	125.28	513.48	303.1	14,793.77

*Average speed noted is calculated on time elapsed from start to finish.

The following figure of merit for each contestant in the Ford Reliability Tour was determined on the formula:

MAXIMUM DAYS OF CENTERLINE

USEFUL LOAD X INVESTMENT SPEED X ————— YO

Y = total + ½ stretch

Z = time of flight

which, translated into English, means that an airplane will have the highest merit points which will—

take the heaviest load in and out of the smallest field
—will fly the fastest with that load—and will do
all this with the least horses power!

Study the official results printed above, and you will see that compared with all other single-engined cabin planes the BELLANCA is 20% to 24% more efficient. That means the BELLANCA single cabin airplane, the Pacemaker, can carry substantially heavy load at a far lower cost than any other cabin airplane.

We have compiled an analysis of the tour, with particular reference to single-engined cabin planes, copy of which will be mailed anywhere in the world upon receipt of written or wired request.



BELLANCA
Aircraft Corporation
New Castle, Delaware, U. S. A.
Globe emblem: Bellanca



BELLANCA

AIRCRAFT ENGINE PARTS



Ex-CELL-O
Aircraft & Tool
Corporation

The PARKS TRAINER



STANDARD TRAINING PLANE AT AMERICA'S LARGEST AIR COLLEGE

Standard training plane at the Parks Air College—largest and best in America—the Parks Trainer is more available to independent flying school operators and to all sportsmen. Especially adapted to student instruction—ideally designed for private pilots—it is the foremost plane of its class on the market today.

Built by a division of the Detroit Aircraft Corporation, the Parks Trainer is backed by an organization which holds a position of acknowledged leadership in the industry. In design and performance it is recognized today as the most satisfactory type of training and sport plane.

Such commanding features as inherent stability and amazing maneuverability—exceedingly low landing speed and 90 m. p. h. cruising speed—coupled with positive flight control set a few of the many superiority's of the Parks Trainer.

The Parks Trainer—equipped with an OX-5 engine—in price at \$1,165. For greater horsepower requirements, the Parks is offered with an Anzani 130 h. p. engine at \$6,000 and with a Wright J-6, 165 h. p. at \$6,350. Our illustrated folder containing complete details will gladly be sent upon request.

PARKS

PARKS AIRCRAFT CORPORATION

Detroit Aircraft Corporation

Detroit, Michigan

Union Trust Building, Detroit

ANOTHER ONE OF THE 65 MANUFACTURERS IN THE AVIATION INDUSTRY THAT USES **SKF** BEARINGS

Detroit Aircraft Corporation



Nothing Left to Chance! Navy's All-Metal Ship ZMC.2 is Guarded at all Vital Locations with **SKF** Bearings

THE successful performance of the U. S. Navy all-metal dirigible ZMC.2, marks a new milestone in the development of aircraft. Years of intensive and rigid research and experimentation preceded the practical application of this radical design. Nothing was left to chance. That's why you will find **SKF** Bearings in the two Wright motors and 86 more on the fin rudders, forward air scoops and hand blower.

It can safely be said that in this remarkable lighter than air craft,

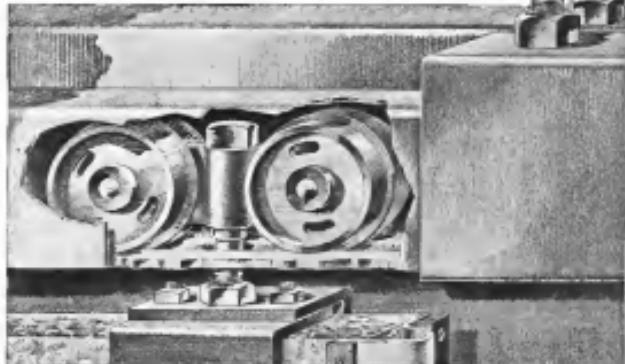
SKF INDUSTRIES, INC., 40 East 34th Street, New York, N. Y.

101

SKF

Ball and Roller Bearings

Sturdy, easy-operating **R-W Doors**



Doors — most important hangar equipment

You want the sturdiest, easiest-operating hangar doors... and we can keep with such service.

R-W doors slide smoothly around the corner inside the hangar. They withstand severe treatment for years, provide easy convenience plus economy and safety.

Regardless of the height and width of the opening, any doorway problem can be

solved with R-W equipment... tin clad, sheeted or Super-Way and type doors... overhead trolley track or floor track, hangers, weatherstripping, bolts and hinges. Richards-Wilcox shoulders responsibility for the complete installation.

Do not hesitate to call one of our branches for free consultation with an R-W engineer, just as you call upon specialists in other phases of your business.

Richards-Wilcox Mfg. Co.

A Division of the General Steel Products Company
The City of Aurora, Illinois, U. S. A.
Manufacturers of Sheet Metal, Tin Clad, Super-Way, and Type Doors
Hangers, Weatherstripping, Bolts and Hinges

Building a hangar? Planning an airfield? Facing any airport problem?



A model hangar at Allentown, Pennsylvania, in which Robertson materials were used.

Come to **ROBERTSON**

LET'S not make any unavoidable mistakes. There is so much yet to be done in this aviation industry . . . so many claims upon every penny of available capital . . . that none of us is justified in repeating experiments that have already failed, or in making mistakes that cost money.

Take hangars, for instance. So many things have already been proven about them that there is no need to make costly experiments. There is no me, for example, to take a chance on unprotected metal roofing or siding for hangars. Do what you will, they will rust away.

There is no me, on the other hand, to sink thousands of dollars into "heavy construction." It costs too much, and moreover it is a dead loss if ever you want to make any changes in

your field. For another thing, there is no use ignoring the need for natural daylighting in hangars.

These and hundreds of other problems have been met and solved. The Robertson engineers have participated in all manner of trials and experiments in hangar construction all over the world since before the birth of modern commercial aviation. They know the answers to most of the questions. Let them look over your plans. Their suggestions will cost you nothing and will not obligate you. Just send your blueprints or plans to

H. H. ROBERTSON CO.—PITTSBURGH

ROBERTSON
*Has the
Experience*



ROBERTSON

THAT EXTRA QUART
IN EVERY GALLON
MEANS A LOT!

I FOUND THAT OUT
THE FIRST HOP
I MADE WITH
QUAKER STATE!



GIVE her Quaker State Aero Oil, then give her the gas—and loo, too, G will find that the extra quart in every gallon means a lot!

And what do we mean by an extra quart in every gallon of Quaker State? Just this . . .

Ordinary refined leaves in every gallon of oil, a quart or more of material that has little or no value in lubricating an airplane motor—a quart of waste.

But Quaker State Aero Oil is not refined in the ordinary way. It is *super-refined*—uridized a step further. And this "extra step" removes the quart of waste that ordinary refining leaves in. In its place you get a quart of lubricant—you get an extra quart in every gallon of Quaker State!

And all four quarts are made from the very finest crude oil that the world produces . . . 100% pure Pennsylvania Grade Crude . . . the value of which is two or three times that of the crudes from which ordinary oils are made!

Let Quaker State itself prove the difference! Ask for it at your airport, let your motor have it . . . then sit back and enjoy the smoothest, sweetest lubrication you ever tried for an airplane motor! Quaker State is sold everywhere—there are over 600 Quaker State distributing warehouses and more than 80,000 Quaker State dealers in the United States and Canada to serve you!

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Order Pure Pennsylvania Products Here:

QUAKER STATE MEDIUM MOTOR OIL . . . QUAKER STATE COLD TEST
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EASTMAN FLYING BOATS equipped with HEYWOOD STARTER

—and now the well known "Eastman Division" of the Detroit Aircraft Corporation is equipping their flying boats with Heywood Starters.

Rapidly this starter is becoming the accepted standard equipment unit of the aircraft industry.

How about your product? Should it not also be equipped with this advanced injection starter?

For the Heywood Starter starts instantaneously. The Heywood Starter starts from moving parts.

The Heywood Starter is a marvel of simplicity—both in operation and design.

The Heywood Starter is light—dependable—and at all times certain.

Send for complete descriptive matter today.
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START-ER
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PILOTS
SAT ON THE
LEADING
EDGE
+ + +
WHEN U. S.

BUILT THE FIRST
PNEUMATIC AIRPLANE TIRES



Back in the early days when flying was young—when courageous pioneers piloted their flying planes from unprotected seats built on the leading edge of the lower wing—when flying and flying were regarded seriously by few—Hof's when the United States Rubber Company first built pneumatic airplane tires and offered them to the infant industry.

Tires were lighter than wood spuds for lesser than today's. But then, as now, ground safety depended on the durability and strength of tires. And as requirements grew more exacting—as planes grew heavier and greater speeds were

achieved—the U. S. Rubber Company continued to pioneer in the development of airplane tires.

More than 20 years of research and development are behind the modern U. S. airplane tire. There is a complete range of sizes with either plain or treaded tread. And every tire is of the low is of web-and-construction—an exclusive U. S. development which guarantees maximum strength without excessive weight. U. S. Branches are prepared to give immediate service to manufacturers and users everywhere.

UNITED STATES RUBBER COMPANY



Transocean air-plane. Manufactured
equipped with United States Tires.
**UNITED STATES
AIRPLANE
TIRES**

KEYSTONE-LOENING AMPHIBIAN AIR YACHT™



Keystone-Loening Air Yacht, of the Western Air Express, of Cedros Island, California, California

TO CATALINA via WESTERN AIR EXPRESS

The "Magic Isle" of Catalina, California's popular pleasure resort, is more popular than ever, now that Keystone-Loening Air Yachts fly there from Los Angeles in the heart of Western Air Express. Fly after fly clock in their comfortable cabin amphibious marine seaplane air taxi, the shortest airway passage in the United States. Passengers are whisked over the fifty mile route from Los Angeles Airport to Avalon Harbor in thirty minutes, saving an all-day round trip by boat from the mainland.

In the height of the season, so many as seven round trips are made daily, each Air Yacht carrying over five hundred passengers per month. An impressive total of less than thousands of miles flown, thousands of passengers carried, hundreds of hours in the air for each ship, has been recorded by these unique amphibians this year, see Air Yacht record page. Over 45,000 miles have been flown during the period. A major transport airline has encapsulated at a maintenance cost lower, reports Mr. C. C. Cole, General Superintendent in charge of operations for Western Air Express, "than any other type of airplane we have operated".

So again Keystone-Loening Air Yachts prove their worth in daily passenger service. Through their use, an ever-increasing number of new passengers are being introduced to the joys of safe, efficient, profitable transportation. We will be glad to confer with interested transport executives regarding the suitability of the Air Yacht for their specific requirements.

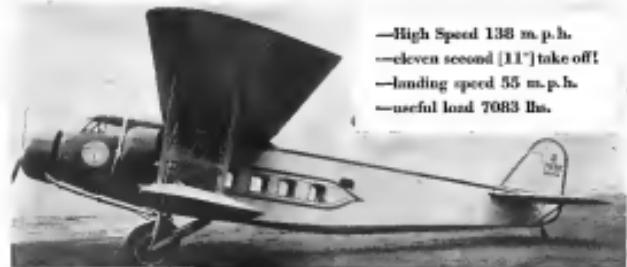
6 to 8 passengers - 325 H.P. - 100 M.P.H. Ceiling - 20,000 ft.



KEYSTONE AIRCRAFT CORPORATION

Division of
CURTISS-WRIGHT CORPORATION
Sales Office: 14 West 42nd Street, New York

PERFORMANCE COUNTS!



THE NEW BOEING MODEL 80-A TRI-MOTORED PASSENGER TRANSPORT

BOEING engineers designed Model 80-A to fly on Boeing routes—and *worthy an airplane is still!* In specifications were based on two years' flying data gathered on the Boeing operated Chicago to Oakland route . . .

A fleet of Model 80-A's are now operating on this "famous air line in the world" . . . flying rigid schedules . . . sea level to 12,000 feet . . .

some airports 6,000 feet altitude . . . ground temperatures from 50 below zero to 125° Fahrenheit! Tests with full load have proven that transport swift, highly maneuverable, economical to operate and comfortable to ride in! It is the commanding plane in its field.

Model 80-A is now offered to the domestic and foreign market. Complete information will be sent upon request.

BOEING AIRPLANE COMPANY

Division of United Aircraft & Transport Corporation
SEATTLE, WASHINGTON



*PERFORMANCE

Boeing Model 80-A with full load

Speed 110 m.p.h. ground speed 115 m.p.h. Altitude 10,000 feet

Ceiling 12,000 feet

Landing speed 55 m.p.h.

Taking off weight 10,000 lbs.

Altitude 6,000 feet

Temperature 50° F. below zero

Temperature 125° F. above zero

Altitude 12,000 feet

Temperature 100° F. above zero

Altitude 10,000 feet

Temperature 110° F. above zero

Altitude 8,000 feet

Temperature 115° F. above zero

Altitude 6,000 feet

Temperature 120° F. above zero

Altitude 4,000 feet

Temperature 125° F. above zero

Altitude 2,000 feet

Temperature 130° F. above zero

Altitude 1,000 feet

Temperature 135° F. above zero

Altitude 500 feet

Temperature 140° F. above zero

Altitude 100 feet

Temperature 145° F. above zero

Altitude 50 feet

Temperature 150° F. above zero

Altitude 10 feet

Temperature 155° F. above zero

Altitude 0 feet

Temperature 160° F. above zero

Altitude 100 feet

Temperature 165° F. above zero

Altitude 200 feet

Temperature 170° F. above zero

Altitude 300 feet

Temperature 175° F. above zero

Altitude 400 feet

Temperature 180° F. above zero

Altitude 500 feet

Temperature 185° F. above zero

Altitude 600 feet

Temperature 190° F. above zero

Altitude 700 feet

Temperature 195° F. above zero

Altitude 800 feet

Temperature 200° F. above zero

Altitude 900 feet

Temperature 205° F. above zero

Altitude 1,000 feet

Temperature 210° F. above zero

Altitude 1,100 feet

Temperature 215° F. above zero

Altitude 1,200 feet

Temperature 220° F. above zero

Altitude 1,300 feet

Temperature 225° F. above zero

Altitude 1,400 feet

Temperature 230° F. above zero

Altitude 1,500 feet

Temperature 235° F. above zero

Altitude 1,600 feet

Temperature 240° F. above zero

Altitude 1,700 feet

Temperature 245° F. above zero

Altitude 1,800 feet

Temperature 250° F. above zero

Altitude 1,900 feet

Temperature 255° F. above zero

Altitude 2,000 feet

Temperature 260° F. above zero

Altitude 2,100 feet

Temperature 265° F. above zero

Altitude 2,200 feet

Temperature 270° F. above zero

Altitude 2,300 feet

Temperature 275° F. above zero

Altitude 2,400 feet

Temperature 280° F. above zero

Altitude 2,500 feet

Temperature 285° F. above zero

Altitude 2,600 feet

Temperature 290° F. above zero

Altitude 2,700 feet

Temperature 295° F. above zero

Altitude 2,800 feet

Temperature 300° F. above zero

Altitude 2,900 feet

Temperature 305° F. above zero

Altitude 3,000 feet

Temperature 310° F. above zero

Altitude 3,100 feet

Temperature 315° F. above zero

Altitude 3,200 feet

Temperature 320° F. above zero

Altitude 3,300 feet

Temperature 325° F. above zero

Altitude 3,400 feet

Temperature 330° F. above zero

Altitude 3,500 feet

Temperature 335° F. above zero

Altitude 3,600 feet

Temperature 340° F. above zero

Altitude 3,700 feet

Temperature 345° F. above zero

Altitude 3,800 feet

Temperature 350° F. above zero

Altitude 3,900 feet

Temperature 355° F. above zero

Altitude 4,000 feet

Temperature 360° F. above zero

Altitude 4,100 feet

Temperature 365° F. above zero

Altitude 4,200 feet

Temperature 370° F. above zero

Altitude 4,300 feet

Temperature 375° F. above zero

Altitude 4,400 feet

Temperature 380° F. above zero

Altitude 4,500 feet

Temperature 385° F. above zero

Altitude 4,600 feet

Temperature 390° F. above zero

Altitude 4,700 feet

Temperature 395° F. above zero

Altitude 4,800 feet

Temperature 400° F. above zero

Altitude 4,900 feet

Temperature 405° F. above zero

Altitude 5,000 feet

Temperature 410° F. above zero

Altitude 5,100 feet

Temperature 415° F. above zero

Altitude 5,200 feet

Temperature 420° F. above zero

Altitude 5,300 feet

Temperature 425° F. above zero

Altitude 5,400 feet

Temperature 430° F. above zero

Altitude 5,500 feet

Temperature 435° F. above zero

Altitude 5,600 feet

Temperature 440° F. above zero

Altitude 5,700 feet

Temperature 445° F. above zero

Altitude 5,800 feet

Temperature 450° F. above zero

Altitude 5,900 feet

Temperature 455° F. above zero

Altitude 6,000 feet

Temperature 460° F. above zero

Altitude 6,100 feet

Temperature 465° F. above zero

Altitude 6,200 feet

Temperature 470° F. above zero

Altitude 6,300 feet

Temperature 475° F. above zero

Altitude 6,400 feet

Temperature 480° F. above zero

Altitude 6,500 feet

Temperature 485° F. above zero

Altitude 6,600 feet

Temperature 490° F. above zero

Altitude 6,700 feet

Temperature 495° F. above zero

Altitude 6,800 feet

Temperature 500° F. above zero

Altitude 6,900 feet

Temperature 505° F. above zero

Altitude 7,000 feet

Temperature 510° F. above zero

Altitude 7,100 feet

Temperature 515° F. above zero

Altitude 7,200 feet

Temperature 520° F. above zero

Altitude 7,300 feet

Temperature 525° F. above zero

Altitude 7,400 feet

Temperature 530° F. above zero

Altitude 7,500 feet

Temperature 535° F. above zero

Altitude 7,600 feet

Temperature 540° F. above zero

Altitude 7,700 feet

Temperature 545° F. above zero

Altitude 7,800 feet

Temperature 550° F. above zero

Altitude 7,900 feet

Temperature 555° F. above zero

Altitude 8,000 feet

Temperature 560° F. above zero

Altitude 8,100 feet

Temperature 565° F. above zero

Altitude 8,200 feet

Temperature 570° F. above zero

Altitude 8,300 feet

Temperature 575° F. above zero

Altitude 8,400 feet

Temperature 580° F. above zero

Altitude 8,500 feet

Temperature 585° F. above zero

Altitude 8,600 feet

Temperature 590° F. above zero

Altitude 8,700 feet

Temperature 595° F. above zero

Altitude 8,800 feet

Temperature 600° F. above zero

Altitude 8,900 feet

Temperature 605° F. above zero

Altitude 9,000 feet

Temperature 610° F. above zero

Altitude 9,100 feet

Temperature 615° F. above zero

Altitude 9,200 feet

Temperature 620° F. above zero

Altitude 9,300 feet

Temperature 625° F. above zero

Altitude 9,400 feet

Temperature 630° F. above zero

Altitude 9,500 feet

Temperature 635° F. above zero

Altitude 9,600 feet

Temperature 640° F. above zero

Altitude 9,700 feet

Temperature 645° F. above zero

Altitude 9,800 feet

Temperature 650° F. above zero

Altitude 9,900 feet

Temperature 655° F. above zero

Altitude 10,000 feet

Temperature 660° F. above zero

Altitude 10,100 feet

Temperature 665° F. above zero

Altitude 10,200 feet

Temperature 670° F. above zero

Altitude 10,300 feet

A ROBIN HELPS FIGHT a Minnesota Forest Fire

Out of the North . . . another story of how the Robin "comes through" in an emergency

FIRE in the backwoods, fanned by a stiff wind. At the first alarm, a poison-equipped Robin skims the smooth surface of a tree-lined Minnesota lake. An aerial fire-fighting crew goes toward an oily black pillar of smoke 4,600 feet high . . . through a thick hot haze into the fire-swept region. Down . . . between a strip of burning woodland and a wall of smoke, to a landing on a tiny fire-walled lake.

Action swiftly—equipment loaded, a quick survey. Back into the Robin for a fast retreat. Out . . . the only way out is up—almost straight up. No job for an unstable plane. But the Robin never flinches. Safely back at the base . . . ready for the next test. That's the story of a Robin fire-fight plane, told by Harry Davidson, a Minnesota pilot.

Under the most hazardous of conditions, a Robin pilots through. Seven tests, unusual demands, and emergency manœuvres—all in a day's work.

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TWO REMARKABLE PHOTOS of the Minnesota forest fire taken from the fire-fighting Robin. Under adverse conditions of bad weather and flying conditions, the Robin pulled through without a trace of trouble. Harry Davidson, the pilot, said "Forest fires never burn holes with fire air," and we can well believe it.



PILOT HARRY DAVIDSON and the poison-equipped Robin ready to take off at a moment's notice. See the Army head of fire-fighting apparatus on the platform.

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strike was the American Cirrus engine
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aviation
earnings



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Luminous in the cockpit. Synthetic leather, leatherette, and
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